THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JULY 24, 1890.

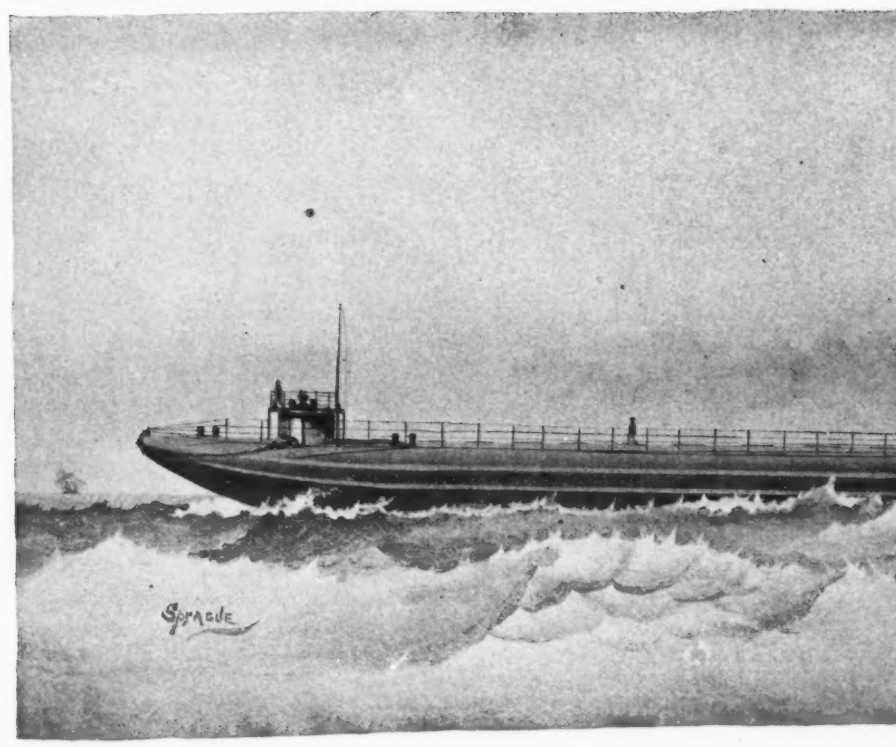
THE WEEK IN IRON CIRCLES.

General Features. Will there be an over-production of pig iron in the last six months of 1890? This is a question of decided moment, and for its answer attention is naturally directed to the Southern furnaces. Without going into a discussion of the subject, we desire to point simply to the labor and fuel question, which have assumed a highly annoying, if not serious, phase in the South, as indicating that there will not be a too general blowing in of furnaces in that section. Production will no doubt be increased somewhat, but within narrow limits, and we do not look for anything like a glut in the general pig iron market. The largest stock of pig iron ever in hand at blast furnaces in the history of the country was on June 30, 1889, when the surplus amounted to 536,286 net tons. From that time it began to decline until, in November, it had been reduced to 198,000 tons. Then began a gradual increase until the present time, the 1st of July showing 380,744 net tons on hand. In addition to the quantity of pig iron held by the mokers or their agents on June 30, 1890, 63,500 gross tons were stored in warrant yards on that day, which, added to the 339,950 gross tons in first hands, makes a total of 403,450 gross tons of unsold pig iron, which is less than three week's supply at the present rate of consumption in this country. Classified according to the fuel used in the manufacture of pig iron, the quantity held in first hands on June 30 was divided as follows: Anthracite and coke pig iron, 74,250 gross tons; cok eand bituminous coal pig iron, 175,531 tons; charcoal pig iron, 90,169 tons. From our correspondents we summarize the situation in the Central West as follows: While there have been one or two deals of some magnitude for Southern iron at Detroit, and also some inquiries for Lake Superior charcoal, the general market has been comparatively dull. The break up of the long strike among the carpenters in Detroit will promote general building operations and cause the buying of considerable material in this line in the very near future. Added to this the cessation of buying, which has contrnued so long, will soon bring some of the small users into the market, and it is safe to predict that more business will be reported from now on than has been done for the past three or four weeks. The firmest feature of the market is Lake Superior charcoal, while Southern and Bessemer seems to have arrived at rock bottom, and remains there with very few fluctuations. Although a somewhat easy tone has prevailed in the Cincinnati market for pig iron during the past week, with the exception of a few special brands, prices have been sustained. There has been a fair degree of activity. The large Southern companies continue very independent, being full of orders for several months to come, but at the same time there are other producers less advantageously situated, or less fortunate in procuring orders, who have been willing to sell, and, and in a few instances, astute buyers have obtained bargains. But, as a rule, the lower prices made have been speculative lots, which have been pressed for sale. Prices at Chicago have been well sustained during the week on both Northern and Southern brands, with the exception on the latter of some concessions in the way of price made by certain Southern furnaces pressed for orders. No change of price has taken place in Lake Superior charcoals and several orders of good size have been placed during the past week. Old car wheels are scarce and in good demand. It is thought at Louisville that very little business will be done before the first of August, when the starting up of mills that have been shut down on account of the hot weather, stock-taking and making repairs, will, it is believed, have a tendency to increase the movement of iron. The prospect for the Fall trade, is therefore, very satisfactory. Southern furnaces are not turning out as much iron as usual, a good many of them remaining out of blast. The general situation of the Buffalo market continues easy and dull. Some large orders have been placed for deliveries during the balance of the year, but as a rule buyers are very indifferent and are chiefly occupied in hurrying forward shipments on old contracts. Pig iron consumers generally predict a heavy business in all lines of their trade during tht coming season. Typical midsummer weather and the absence of many of the principal local buyers, have resulted in a quiet and unruffled market at St. Louis. Purchases are reduced to small lots covering immediate needs, and for the present both buyers and sellers seem to have called a temporary truce on later business. Increased activity, however, will soon prevail, as consumption in most branches is very active, and everything points to a heavy Fall trade. It is reported at Pittsburgh that parties are now in the market to place contracts for a large amount of pipe, which will require between 35,000 and 40,000 tons of skelp iron to complete the contract.

Iron Ore. Since there has been no market for some weeks, it would be idle to comment upon something that does not exist. The fact is, the sales agents are enjoying their vacations which, as a matter of history, they might as well have begun last December, after the bulk of the ore was sold. The situation regarding freights remains unchanged as well, prices being at the old notch, and very few charters being reported in addition to the regular charters. The imports of foreign ore fully justify the forecast made in these columns early in the season, when the bulk of the foreign output was reported to have been engaged by English furnace interests. The May receipts of foreign ore at the port of New York were 3,419 tons, dropping off to less than half that quantity for June. There is no movement whatever in lake ore, and no improvement is likely to take place until a betterment is noted in the pig iron market.

Pig Iron. There is a general impression abroad among makers of pig material that an improvement in price is due about September 1. While it is natural to expect an advance after a long period of low prices, the additional claim is set up on the part of some leading furnace concerns that the demand for pig iron is steadily increasing by reason of the very large number of new consumers, such as foundries, that are constantly coming into the market, this increase being far in the advance of the corresponding growth among the furnaces. It cannot be denied that the consumption of iron is enormously large and the market is very active without, however displaying any indications of strength. Thus most of the material sold is for either immediate or very short delivery, prices varying with almost each individual sale. Several large manufacturers of agricultural implements were among the buyers this week, and, while their orders undoubtedly relieved the market to some extent, the price was hardly profitable to the makers. The call seems to be for foundry iron just now, and quite a good deal of charcoal iron is finding a market. Forge iron is a trifle dull, owing to the shut-down of the mills.

Merchant Iron. The trade in bar iron is more than good, but there has been no corresponding advance in quotations. Still, the mill men have little to complain of at tnis time. The going rates are fairly good and the volume of sales is large enough to warrant the forecast that the mills will have an abundance of work for the remainder of the year after starting up again. Muck bars lead the market and are firmly held. There is also a good demand for sheets and plates, at advancing prices.



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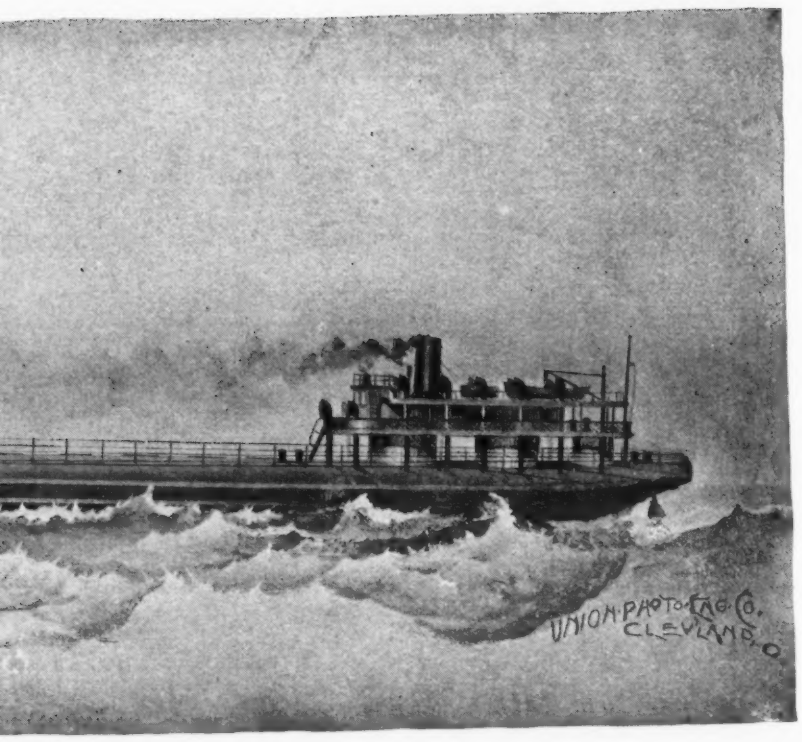
THE STEAMER COLGATE



ER COLGATE HOYT.

AMERICAN CAPITAL FOR AMERICAN INDUSTRIES.

The recent incorporation of the well-known firm of Procter & Gamble, of Cincinnati, marks a new departure in the reorganization of American industries. In this instance the same form of investigation and re-capitalization were gone through with as in the sale of existing plants to English investors, but with the very wide difference that the new stock and bonds are to be sold exclusively to American capitalists. It must be said that the magnificent showing of this firm afforded a tempting field for the work of the reorganizer; and that it was not passed over to an English syndicate was not for the lack of numerous offers from that source. As an indication to the owners of similar extensive plants how they may effect a like favorable reorganization, we present herewith an outline of the course pursued.

In the first place the matter was intrusted to a responsible firm of local brokers who had influential Eastern connections. A competent committee of local business men made the valuation of the plant, and a firm of chartered accountants made the investigation of the books and business. From the reports of the latter it appears that the net profits of the concern for the past three years have been as follows: For 1887-8, $429,628.03; for 1888-9, $486,672.76; for 1889-90, $585,934.98. The profits, it was found, would average $500,100 per annum and would pay 6 per cent. on $2,000,000 of first mortgage bonds, 8 per cent. on $2,250,000 of preferred stock, and 12 per cent. on $1,250,000 of common stock, and leave a surplus. It was therefore decided to incorporate the company under the laws of New Jersey on a share capital of $4,500,000, divided into $2,250,000 of preferred stock and $2,250,000 of common stock, and to issue bonds as above. The real estate (consisting of 67 acres adjoining the corporate limits of Cincinnati), buildings, machinery and appliances were valued at $2,525,000 and the merchandise and stores on hand and personal property owned by the firm at upwards of $1,250,000, making a total of $3,775,000. The firm are to receive as part payment for the properties sold $3,000,000 par value of the above securities, of which they agree to hold and not sell for five years $1,000,000, par value, of the common stock, and also contract that during this period this stock shall receive no dividends until 12 per cent. per annum has been paid on the remainder of the common stock. The management will continue as at present for five years. The bonds are secured by a first mortgage upon all the real estate of the company as well as by a chattel mortgage upon its personal property. They are payable in fifty years from July 1st, 1890, but are redeemable at the company's option after the expiration of ten years.

We commend this plan as pre-eminently wise and patriotic and predict that other large establishments, which have heretofore held aloof from transferring their control to English capital, will find in the above plan an easy and agreeable method of developing their properties.

CANADA AND RECIPROCITY.

We are surprised to observe that the Royal Commission on the Mineral Resources of Canada has, through its secretary, already been driven to defend its report from attack. More surprising still is it that falsehood should be the weapon chosen for this defense. The particular charge against the report is that it advocates reciprocity with the United States rather than the retention and strengthening of the present system of protection in that country. To even the casual reader of the report this position was apparent. In our review of the report, at the time of its first appearance, we specially called attention to this surprising and impracticable feature—surprising because at variance with the policy of the present Canadian government; impracticable because the people of the United States do not want any such arrangement. Some of the Canadian papers took up the charge, and the secretary of the Commission has seen fit to rush into print in sweeping denial. The words of the report itself are a sufficient answer, and the *Canadian Manufacturer* does well to quote the exact language capable of such interpretation. We might quote still stronger passages, but the evidence is sufficient, The able secretary of the Commission should read his own report.

SOUTHERN PIG IRON IN PITTSBURGH.

A Pittsburgh iron and steel broker has been talking with the *Dispatch*, of that city, in regard to the influence of Southern pig iron upon that market, his text being the recent increase in rates by the Pennsylvania Company. The proportion of Southern iron coming into that section over the Pennsylvania and its subsidiary lines, he claimed, is but small in proportion to that hauled over the Western lines including the New York, Pennsylvania and Ohio Railway from Cincinnati and the Pittsburgh and Lake Erie from Youngstown, the Chesapeake and Ohio to Huntington, Kentucky, and thence over the Ohio River Railway tracks to Pittsburgh, and the Baltimore and Ohio. These are declared to be the natural routes over which Southern iron would reach Pittsburgh, the Eastern supply being delivered over the Pennsylvania and Reading lines. The point of output of the bulk of Southern iron is West of Chattanooga, and it is claimed to be more natural to ship to Cincinnati, by the Queen and Crescent route, than by the Eastern lines. The effect, therefore, of the advance in rates by the Pennsylvania Company was imperceptible.

The matter might assume a graver aspect were the importation of Southern iron into Pittsburgh and tributary valleys much of a factor. The fact is, Southern pig iron has not for some time had any influence upon the market, being unsuitable for the particular grades of iron manufactured in that section; so that, whether the Pennsylvania Company raises or lowers its rates, little if any effect is experienced.

OUR TARIFF BILL DOESN'T SUIT THEM.

Mr. S. A. Fuller, Manager of the Union Rolling Mill Company, of Cleveland, as is well known, is a keen observer and an intelligent student of the drift of events. Mr. Fuller has just returned from England, and in answer to a reporter's question as to how the McKinley bill is regarded in that country, said:

> Most seriously, indeed. The English seem to feel its importance more than the Americans. There is consternation among the English manufacturers, and should the bill fail to become a law there will be many happy hearts over there. Major McKinley's defeat for re-election would be hailed with joy. While I was in England labor organizations and manufacturers all over the country were calling the attention of Parliament to the disastrous effect the bill would have on business in England, and asking it to adopt measures of relief. Of course the English parliament can do nothing for them. The tariff is the sole topic of discussion in the hotels in England. The majority of the people found at the hotels there are Americans. In the offices you will see groups of half a dozen Americans with one or two Englishmen in their midst—all discussing the tariff—and the latter are not backward in condemning it on account of the effect it will have on them. I thought lots of times I had dropped down into a Harrison-Cleveland campaign.

Recent files of the English papers tend to confirm Mr. Fuller's statements in every respect. Mr. McKinley's name is almost literally at the head of every column and upon every lip. No recent piece of parliamentary legislation has been the subject of more comment. Of course, as the London *Iron and Steel Trades Journal* sagely remarked, "attempts on our part to influence the passage of the McKinley Bill would be futile, and perhaps worse than useless." It had hope, however, in the "interests within the boundaries of the United States identical with our own" [Great Britain's], and "these forces," it argued, "would exercise their power against the bill." That is the feast spread by the British manufacturers and their American allies, to which we are invited.

SUNDAY INSPECTION OF BOILERS.

Are Sunday inspections of boilers, in manufacturing plants, a necessity? Undoubtedly, in rare instances, but not as a rule. Observe what is said on this point by one of the largest boiler inspecting companies in the world:

> We have on several occasions called the attention of our patrons and readers to the importance of dispensing with work on the Sabbath, and especially would we urge upon steam users and manufacturers in general, that the servance of the Sabbath is a duty which is morally binding upon all. The custom of making repairs and improvements on the Sabbath, is, in our opinion, a loss in the end. It cannot be a serious interruption to any business to give a few days every year to the necessary overhauling and repairing of the motive power of a mill. If men are required to work on the Sabbath, the influence will be demoralizing. They will not have the same respect for any law they otherwise would, nor will they, in our opinion, have the same respect for their employer's interests. The whole practice is wrong, and contrary to the instincts of those even who have no religious convictions. Obedience to law is the strong bulwark to the happiness and peace of any community, and the moral law is the foundation of all civil law.

The whole practice is the result of a thoughtless, and perhaps selfish, disregard of the rights of others, in the modern rush for wealth. Let manufacturers ponder what is above quoted and see if they cannot remedy this matter. A very little readjustment of affairs will make it possible to prosecute inspections and make repairs at other times than on Sunday. Aside from the moral phase of the question—which we would by no means ignore—is the business and economic aspect, which at least ought to have some weight.

THE manufacturing census of the various large cities will be well under way within the next thirty days. Manufacturers will greatly assist in this important work if they will set their book-keep

ers at work to make an analysis of their business for the nearest business year. Let there be as cheerful a compliance with the request of the census authorities as is possible under the circumstances, and each city will thus secure the rank which its important industries entitle it.

ENCOURAGING crop reports come from the South. A big yield of corn and cotton will help the iron business amazingly.

THE tariff debate is on in the Senate, and the next few days are big with possible results.

TALKING OUT IN MEETING.

Evidently the American attorneys for free-trade have not conducted business to the full satisfaction of their foreign principals. Notwithstanding the vigorous opposition the McKinley bill has encountered, the probability that it will without serious modifications be enacted into law, occasions unusual anxiety among European manufacturers.

The reiterated assurance of free-traders on this side that foreigners have but to add the tariff to their prices and purchasers must pay it, however effective for party purposes here, seems by no means satisfactory to such foreign manufacturers as have had practical experience with American tariffs. British manufacturers are especially close students of our tariff legislation, and cautiously shape their business accordingly.

To illustrate: Last fall the town of Llanelly, the centre of the tinplate manufacture, took steps for increasing the public water supply. No sooner was it announced that the McKinley bill proposed to advance the tariff on tinplates and render it possible to manufacture them in this country, than a public meeting was called, at which, after the assurances from the heads of all the large tin-plate works that under the proposed legislation "the time would come when Americans would make their own tin-plates," it was decided to postpone the work, "in order to see what would be the fate of the tariff bill" before the American Congress.

Also in the centre of the cutlery manufacture equal anxiety is manifested. A delegation recently waited on the mayor of Sheffield and requested an official protest against the passage of the McKinley bill. The spokesman, who claimed to voice the sentiment of all Northern England, significantly added, among other arguments for the proposed step, that "the action to be taken in Sheffield would strengthen the hands of the American opponents of the bill." Just what this strengthening process was to be, though not announced at the time, may be inferred from a recent statement in the *Tin-Plate Record*, that, "every tinplate importer in the country has been assessed $10,000, and the English syndicate which controls the manufactories and mines in Monmouthshire and Cornwall has augmented the sum to nearly one million dollars in order to defeat the tin-plate clause in the McKinley tariff bill."

The Sheffield mayor's response was equally suggestive, in which he insisted that British manufacturers could not afford "to stand still and see protection measures adopted in America"—for the time was within his memory when "the American market found trade for one-half the population of Sheffield" in making cutlery now supplied in most part by American manufacturers.

It is in face of such facts as these that intelligent men in this country are expected to believe that the only effect of Protection is to add to the price of imported products. It is in furtherance of such presumptuous foreign interference with our laws as above indicated that American voters are asked to second the British demand for free foreign trade.—[Illinois Branch American Protective Tariff League.

High Southern Iron Rates.

There is a wide difference of opinion among iron merchants and railroad officials in this city, says the Philadelphia *Record*, concerning the effect that will be produced by the increase in freight rates on Southern iron bound Northward, which has just been made by the Pennsylvania Railroad prorating with Southern lines. For six years past the Pennsylvania Road has been steadily reducing rates on Southern iron, and in that time the total reduction has been 95 cents per ton on iron from Chattanooga to Pittsburgh, until the rate was about $3.90, and the Southern product came into sharp competition with Northern iron.

A prominent official connected with the freight department of the Pennsylvania Road yesterday said: "The reduction may in some cases be 5 per cent., but that will depend on the distance and route shipped over. The Southern people will kick, but it is the policy of the Pennsylvania to foster local industries."

When General Freight Manager Boil, of the Reading Co., was asked what course that road would pursue, he said: "We have always protected our own furnaces, by charging Southern iron high rates, and we shall continue to do so."

A member of the firm of Tatnall, Lea & Sons, said: "As the Baltimore & Ohio must deliver over the the Reading tracks, the Reading's policy of maintaining high Southern freight rates on iron must prevail, and no cheap iron can be got in on that line. These three roads about control the trade here."

When asked how the advance would affect the iron people of this State, Justice Cox, Jr., of the Catasauqua mills and Chickies furnaces, said: "I don't think the Southern iron furnaces will suffer at all. If the Pennsylvania don't carry their output it will be shipped by water or in some other way. The Southern furnaces are there to stay. The advance will, to a certain degree, help Northern iron men, as the rates which have been charged have been prohibitory to a considerable extent. The railroad people are the only ones who really reap any benefit from an advance in iron, for they have an excuse to raise rates. They would do better if they were to reduce their local freights as well as advance the Southern through rates."

AMERICAN INDUSTRY IN CUBA.

The rich iron ore deposits near the coast in the southeastern portion of Cuba are now in a fair way to be developed on a very extensive scale, by American enterprise, to help supply the demand for Bessemer ores in the United States. The Juragua Iron Co., established in 1883, was the first in this field. This company, whose office is in Philadelphia, has been extending its operations each year. In 1889 it shipped 256,278 gross tons of iron ore to this country from its Cuban mines, and it expects to ship over 300,000 tons during 1890. It was announced some time ago that a number of Cleveland capitalists, including the Hon. Geo. H. Ely, President of the Western Ore Association, had secured control of an extensive tract of iron ore land in the vicinity of the Juragua company's property. We are advised that these gentlemen are now making preparations to open up their portion of this iron ore region.

A third company is now in this field, called the Sigua Iron Co. This company was organized last Spring and represents Philadelphia capital. The property controlled by the company comprises about 34,000 acres, extending twelve miles along the coast and inland to the mines, the ore property, which includes about 2,000 acres, being about seven miles from Sigua bay. This extent of territory gives the company ample room for mining towns, shops, harbor facilities, etc. The Sigua mines are about eight miles east of the Juragua mines. The Sigua river runs by the mines into Sigua bay. The company is already preparing to build a railroad from the mines along the river to the bay and to provide suitable docks for shipping the ore.

The quality of the Sigua ore, which is red specular in character, is fairly shown by two analyses. The first analysis represents an average of all ore exposed on the surface of the ground, and is as follows: Iron, 58.10 per cent.; silica, 15.50 per cent.; phosphorus, .034 per cent.; sulphur, .046 per cent. The second analysis was more carefully sorted, and was taken by knocking off three hundred small pieces. It resulted as follows: Iron, 64.20 per cent.; silica, 5.10 per cent.; phosphorus, .023 per cent.; sulphur, .042 per cent. No traces were found of titanium or other substances which would render iron made from this ore poor in quality.

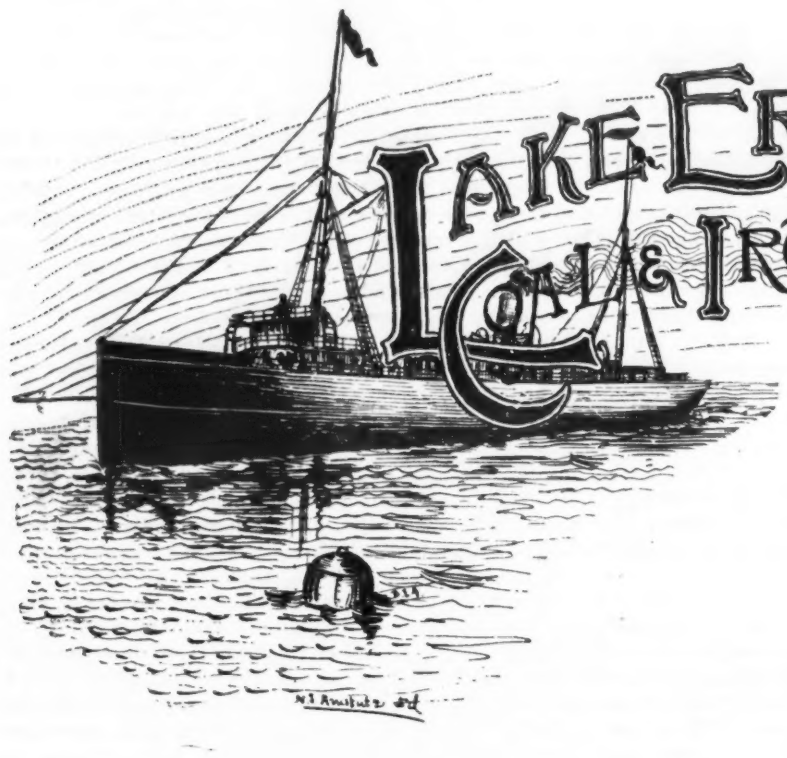
The estimated cost of delivering the ore from the Sigua mines to the docks at Philadelphia, including a royalty of 25 cents and the duty of 75 cents per ton, is $4.40.

The committee which examined the property included men thoroughly familiar with all the details of determining the quality of ore and of mining, transporting, selling and smelting it. This committee was composed of Messrs. S. H. Chauvenet, David Thompson, Clarence M. Clark, E. V. D'Invillers and Edmund D. Smith. Mr. Chauvenet was for nine years chief engineer of the Pennsylvania Steel Co., and later was manager of the Robesonia furnace, at Robesonia, Pa. Mr. Thomas is manager of the Thomas Iron Co., at Hokendauqua, Pa. Mr. Clark is first vice-president of the Virginia Development Co., which is opening up the mineral regions of Virginia. Mr. D'Invilliers is an iron-ore expert and has been a member of the State Geological Survey of Pennsylvania. Mr. Smith has been actively engaged for twelve years in the handling and transportation of foreign and domestic iron ores. The committee also obtained the services of Mr. W. J. Rattle, the well-known iron ore expert of the firm of Rattle & Nye, of Cleveland, to make a careful and conservative report upon the Sigua property. The reports made by Mr. Rattle and the committee were most favorable in all respects.

As at present constituted, the officers of the Sigua Iron Co. are as follows: President, S. H. Chauvenet; Vice-President, Thomas H. Graham; Secretary and Treasurer, George F. Baker; Chief Engineer, Captain D. B. Greene, the well-known harbor expert. Included in the directory of the company are Edmund D. Smith and David Thomas. With such eminently practical men controlling its affairs, the success of the company is assured.—[Bulletin of the American Iron and Steel Association.

Rolling Cold Steel.

The particles of any metal in cooling are supposed to make a definite crystallized arrangement. Heat, in a certain sense at least, is as to the atoms a disintegrating or repellant power, and, under great force or pressure, crystallizations may be compelled to rearrange themselves on new lines or submit to a change in form. In drawing wire, for example, the force applied is in the direction assumed by the fibre, as softened by heat, and its strength is supposed to depend upon this arrangement of particles, compacted more or less by the die through which it was drawn. Now rolled wire is a reversed process, as the compression of molecules both changes their form of arrangement and form of crystallization. Up to a recent period heat was always supposed to be a prime factor in the process, and that without it no alteration in what may be styled granulation was possible. Now a Chicago paper announces a change in manipulation that completely explodes the old theory. Bars of cold steel are as easily rolled into wire as if the metal were hot, and, not only that, but the process nearly doubles the tensile strength. That of hot-drawn steel wire is 56,460 pounds to the square inch, while cold rolled is 105,800 pounds. What is the nature of the changed arrangement of particles that produces such results? It must be compression that forces the atoms into new forms, or compacts them more closely together, and yet one effect of compression is to evolve heat. The fact of added strength is abundantly vouched for, but the reason of it remains to be explained. Manifestly if wire can be rolled from cold bars with such results, why may not steel plates for ships or other purposes; yea, why not even rail road bars? If these things are possible, with strength doubled and cost diminished, this manufacturing industry is certainly on the eve of a total revolution. Science, too, has added to its domain the wealth of a new discovery whose value is beyond estimate. Gains on any line of advancement as all experience proves, are but a prelude to greater gains on other or similar lines. The ending of a beginning in what is new now is beyond the ken of the wisest.



LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

II.—ERIE.

Erie, is, undoubtedly, the first port on Lake Erie to receive a consignment of iron ore, which in those early days was the beginning of a development—now long ago attained—that should bear away the trophy of iron production from the East. This early Eastern activity is very graphically described in an old print as follows:

"The smelting of iron ore and the manufacture of iron has become an immense business in our country. The development of ore deposits and of coal used in smelting are among the marvels of our history. English navigation laws discouraged iron manufacture in the colonies. Only blast furnaces for making pig iron were allowed. This product was nearly all sent to England in exchange for manufactured articles, and the whole amount of such exportation at the beginning of the old war for independence was less than 8,000 tons annually. The colonists were wholly dependent upon Great Britain for articles manufactured of iron and steel, excepting rude implements made by blacksmiths for domestic use. During the war the Continental Congress was compelled to establish manufactures of iron and steel. These were chiefly in *Northern New Jersey, the Hudson Highlands, and Western Connecticut, where excellent ore was found*, and forests in abundance for making charcoal. *The first use of anthracite coal for smelting iron was* in the Continental armory *at Carlisle, in Pennsylvania, in* 1775. But charcoal was universally used until 1840 for smelting purposes."

Thus the historian Lossing records these early triumphs of man over the products of nature. We have italicised certain portions of the quotation, in order to more clearly bring out the matter referring to the early activities in the industries which to-day have reached such marvelous growth, and from the necessities of the colonists, struggling for recognition in their individual rights, they became the victors not only in the establishment of a government which was their cherished ambition, but also made subservient to their needs the storehouses of nature, and thus record man's supremacy over the latent forces and materials of the universe.

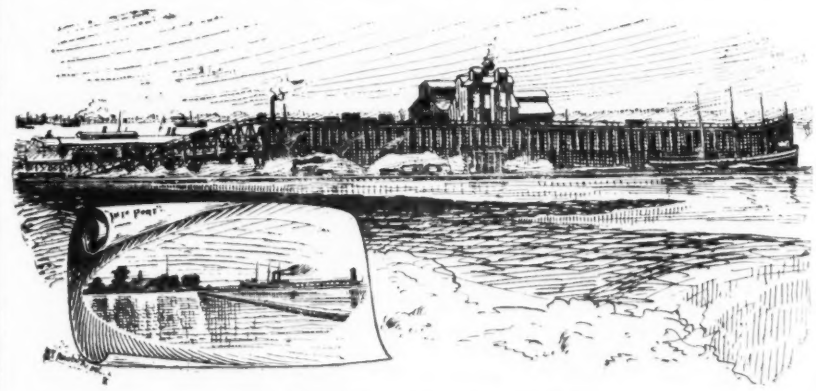
The early coal operations did not become a part of the commerce of the country until about 1820, when 365 tons were sent to Philadelphia, and in five and one-half decades the productions of American mines placed upon the market reached the stupendous amount of 15,000,000 tons annually. The total coal production of last year in the mines of the United States was 132,000,000 gross tons, so quoted by the *Coal Trade Journal.*

Thus has the trite saying of Bishop Berkeley, "Westward the course of Empire takes its way," been realized, and from the East we find the field of ore productions has traversed to the far Northwest, which now lays claim to the greatest of modern developments.

Following the transposition of the field of production, there arose a new and co-existent activity in the means of transporting this material in its natural state to the fields of nature's abundant coal supply, and then, in furnaces augmented by the stored heat of ages, become the passive agent of man to be used in all the various ramifications of trade, commerce and industry. As a natural sequence to these early awakenings and discoveries of the ore in its new fields, came the matter of transportation. A port of entry for the discharging of the early cargoes was a matter of necessity; hence the selection of *natural* harbors, and of this kind Erie was the only one upon the south shores of Lake Erie, and, undoubtedly for this reason, was chosen as the first port of entry for iron ore in transit to the furnaces of Pittsburgh. This was accomplished by the reshipment at Erie by the Erie and Beaver Canal, which also served as a feeder of the Ohio Canal. From Mr. R. O'Brien, the present agent of the Erie and Pittsburgh docks, we learned that this first ore was brought down the Lakes in 1856. The harbor thus selected bore many marks of the shapings of nature to become the servant of man; sheltered upon the northwest by Presque Isle Island, which is now joined to the shore, forming a beautiful peninsula. This historic spot was washed on all of its sides by the waves of the lake from 1833 to 1864, and in 1835 the break at the "neck" was nearly a mile wide, and near this point, or what is now known as "The Head," iron ore was mined for several years, thus placing Erie at one time in the role of a producer as well as a receiver of ore. The mineral here mined was used in the furnaces of Vincent, Nimrod & Co.

The inner shore of the peninsula is composed of many coves, small bays, etc., and one of them, Misery Bay, in which Commodore Perry's ship Niagara was sunk after the war of 1812, where it yet remains. A lighthouse is provided upon the outer shore of Presque Isle, and another is had at the outer end of the north pier. This latter one was established in 1858, and a set of range lights were erected and maintained since 1860, by the Government. Prior to this time, from 1852 to 1860, they were maintained by voluntary contributions of captains and vessel owners. The first light was the one erected on shore about south of the present piers. This was constructed in 1818, and rebuilt in 1866. The present channel is a direct one from the deep lake water into the harbor, and the present work of the supervising Government engineers is to complete this channel so as to measure 300 feet wide, with 18 feet of depth at low water, and all future improvements must look toward maintaining this channel, which leads to an anchorage area of two square miles with a depth of from 18 to 27 feet, and from this anchorage area direct access is had to the different docks, which have, at low water, a depth of 16 feet. The south pier is joined by a shore arm, thus effectually protecting the shipping within the harbor at any time. The whole area of the harbor is three and one-half miles long by one mile wide, giving an aggregate of three and one-half square miles, having a depth of from nine to twenty-seven feet. The first piers were constructed in 1825.

The docks nearest the harbor entrance are the ore docks of the Philadelphia & Erie Railroad, upon the opposite side of the slip which accommodates



GENERAL VIEW OF ERIE HARBOR.

The Anthracite Coal Trestle and the Ore Dock of the P. & E. R. R. At the extreme left, in the distance, are the E. & P. R. R. Docks.

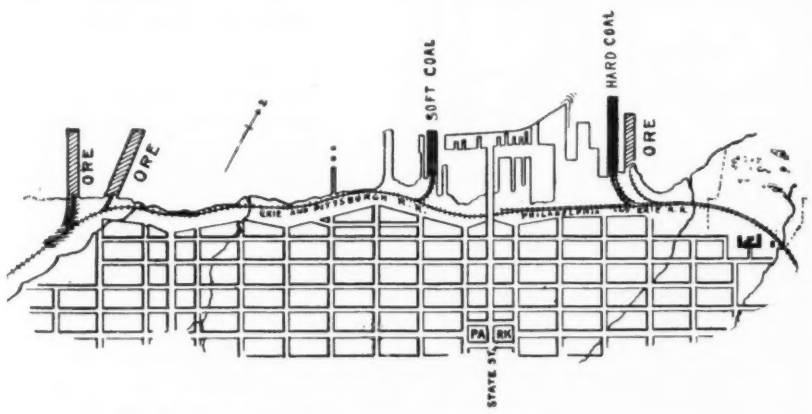
the anthracite coal trestle owned by the same company, and leased by W. L. Scott & Co., who have Mr. John Saltzman in charge of their management. To the west of State street, or the public docks, is the old canal dock, where the trans-shipments from lake vessels to canal boats were made in the time when such conveyance had not been displaced by the railroads leading from Erie to the interior. This dock is also known as the "Reid Dock," and at the time of its construction, at about 1815, it extended out from shore to a depth of eight feet of water, at that time accommodating the largest vessels on the lakes. The dock was leased some years since by W. L. Scott & Co. for their bituminous coal trade. Further down the bay, at the mouth of Cascade Creek, are the large ore docks and storing trestle of the Erie & Pittsburgh Railroad. These constitute the dockage facilities of Erie as far as they concern the coal and ore trade; though not many in number they make up in extent and capacity what they lack numerically.

The Philadelphia & Erie Railroad's ore dock has a frontage of 1,200 feet by 100 wide, and upon it, in handling an anticipated 100,000 tons of ore, this year employes four MeMyler rotary hoists and four bridges to accommodate the storage portion of the dock. Three hundred feet of this dock have just recently been added. The handlings last year were 80,000 tons. This company propose the erection of a storage trestle to the east of their present pier, which will make their capacity one-third more than at present. The ore business is under their own management, supervised by Mr. Rees, the company's freight agent, who has Mr. Charles Lechtner as superintendent of docks. The hard coal trestle adjoining is 1,200 feet long by 136 wide, and is composed of 68 pockets, having an average capacity of 90 tons each. There are also a large number of storage bins under the trestle. The cargo shipments in 1888 reached 285,795 tons, and their annual capacity is fully 500,000 tons. The present pockets face upon the slip which lies between this pier and the ore pier to the east. However, it is designed at some future time to erect pockets

upon the west side of the present pier. This will increase the capacity fully 50 per cent. W. L. Scott & Co. are the lessees of this the only anthracite dock in Erie. Their connection dates from 1874. Previous to this time the management was in the hands of Burton Bros. & Co., which business connection was maintained subsequent to 1868. The dock was originally operated in 1860 by David Burton & Sons, for the Sunbury & Erie Railroad, now the Philadelphia & Erie. This dock can now receive from the cars 5,000 tons daily, and 1,000 tons can be loaded into vessels per hour. Three vessels can load at one time.

The "Reid Dock" is 1,200 feet long by 125 feet wide, affording access to vessels on both of its sides, thus giving an aggregate of 2,400 feet front, and the handling capacity is 300,000 tons of soft coal annually. The shipments from this dock in 1888 were 104,535, and the year before 73,762, showing a fine gain, and with their present large capacities will undoubtedly hold this ratio of gains for the last and present years. Two thousand tons of coal per day can be handled. Early shipments of soft coal were made to Buffalo in 1854. The canal was opened in the '40's and continued until 1871.

The Erie & Pittsburgh docks are located at the mouth of Cascade Creek, upon the site where a number of the vessels used by Commodore Perry were built for historic naval battle off Put-in Bay, on that memorable 10th day of September, 1813. The vessels constructed at this point were the Lawrence, Niagara and Ariel. The ore docks have an aggregate frontage of 5,200 feet, and a storage trestle of 800 feet, to which 200 feet are being added, which gives a daily average capacity of 10,000 tons, and an annual storage capacity of 200,000 tons, and the railroad company is contemplating improvements to the storage facilities which will enlarge their capacity to 800,000 tons, and the anticipated amount to be handled in 1890 is set at 500,000 tons. Their dockage front is divided into three docks, and in unloading facilities there are provided nine McMyler and eight Lockport rotary hoists. These docks are being extended so as to keep pace with the growing shipments. The unloading from vessels is either direct upon the storage space of the docks themselves or direct to railroad cars for shipment to the furnaces. The stored ore from the docks is taken by dump cars to the large storage trestle for classification, etc., lying upon these huge piles until called for by the consumers. The contemplated improvements have in view the using of Brown hoists. These docks are owned by the Pennsylvania Railroad Co., and are operated by the Erie & Pittsburgh Co., under the superintendency of J. M. Kimball, and more



MAP OF THE DOCKS AT ERIE, PA.

The Erie & Pittsburgh R. R. Docks. Reid's Dock. W. L. L. Scott & Co.'s Hard Coal and the Phila. & Erie R. R. ore docks.

immediately under the supervision of C. F. Perkins, Division Freight Agent for Erie and Ashtabula. Nominally the Philadelphia & Erie road is under the Pennsylvania system, but a distinct local management is maintained. The ore receipts at the Erie & Pennsylvania docks for 1888 were 240,000, and in 1889, 310,000 tons, and in one of the previous years (included in the last five) the receipts were only 100,000 tons.

The aggregate dockage in the iron ore business at Erie reaches the handsome length of 6,400 feet.

On June 24 contractors at Erie received orders to proceed with the work of building additional docks and constructing extra yard room at once for the Erie & Pittsburgh Railroad Co. and to hasten the storage trestles to a speedy completion. The work ordered will double the capacity for handling ore at Erie and will call for the expenditure of fully $200,000. The work will be completed in time for next season's traffic. J. Lewis Linn Lake, of Philadelphia, has the contract.

As an illustration of the changes made in recent years in the handling facilities, we have the words of Mr. O'Brien the General Agent of the docks:

"Fifteen years ago the cost of ore transportation was $3.50 per ton in vessels of 500 to 600 tons burthen, and now, from the same ports, $1.00 per ton in vessels of 2,700 to 2,800 tons capacity."

We are much indebted to Mr. O'Brien and the Chief Engineer of the Philadelphia & Erie Railroad for valuable information and data cheerfully given us. Among the reminiscences related by Mr. O'Brien was the following:

"In the early days of handling ore, the boats were of small capacity and, of course, had little depth of hold, so that the means employed for unloading them do not seem unreasonable after all. They were very meager however, and consisted in erecting a platform in the hold of the vessel upon which the ore was shoveled, and from this platform the second time shoveled by hand on deck, and from there loaded on wheelbarrows and carted onto the docks. Or, in case the shipments were to be made direct by canal, the carting was done, of course, upon the canal boats direct. The earliest and first hoisting by machinery, was accomplished at Erie, and the style of derricks which raised the ore from the hold of the vessel and then swung around the load to either the dock or the intended means for conveying it to other places were the derricks built at Lockport, N. Y., and the few of which are still in operation, in their time, have done good service. The time between shoveling ore out of the holds of the vessels and taking it out by the derricks was filled in by raising it with a horse and tackle blocks."

Press Forging.

The distinction between melted metal flowing into moulds by gravity, and being forced into mould by pressure, when only softened by heat, is not so great as people imagine. The first is as old as civilization; the latter is a new process, developed and made possible by implements of recent invention. All over the world press forging is increasing. Presses to exert thousands of tons are now common, and the most intricate forms are produced by the flow of metal heated only to redness, the same as it would be for hammering. Even in San Francisco a good many things are being forged by pressure that were formerly cast, notably the parts of "cable grips" and like things are produced by "presses," nearly as cheap as castings of malleable iron or steel. The latest thing in such forgings are railway axles. Blanks of a uniform section are placed in dies which form a matix, having the form of a completed axle, with its necks and collars. Powerful plungers driven by hydraulic force, act on the ends of the blank, forcing or "flowing" it into the mould, just as castings are made of fluid metal. The work demands celerity to prevent cooling by radiation, but the process is, no doubt, a practical and economical one. —[Glasgow Engineer.

Mortgage—Fixtures—Machinery.

A mortgage on real estate and buildings contained the following provision, viz., "Together with the building or plant of said first party thereon situated, and the engines and boilers and fixed machinery appurtenant to said building," The company making the mortgage as a manufacturing corporation, and its building, engines and boilers were fixtures when the mortgage was executed. The Supreme Court of Minnesota, in the case of Beaupre vs. Holland & Thompson Manufacturing Co., affirmed a judgment finding that certain other articles of machinery were fastened to the building and used for manufacturing, which, generally speaking, were heavy machines such as are now used about a foundry or machine shop, were included in and covered by the mortgage. The court said that in construing the descriptive portions of such mortgage, effect should be given to all the words, terms and expressions used therein, for it was obvious that by their use property was intended and included which was no part of the realty, and which would not pass by a mortgage upon it alone and that written descriptions in such instruments are to be interpreted in the light of the facts known to and in the minds of parties when they are executed.

Our Probable Iron Production for the First Half of 1890.

The returns of the capacities of furnaces in blast on the first of the several months of this year show that we will have made by the end of this present month between four and four and a quarter million gross tons of pig iron, or in other words, we probably will have made more iron in the first half of this year than we made in the whole of 1885. And it is probable that nearly four million tons of this output will have gone into consumption during the current half year. Of this consumption not over a quarter of a million tons can be credited to the demands of new railroads; the balance, great as it is, has gone into current repairs, a rather restricted building demand, and an increased demand for machinery and rolling stock.—[American Economist.

Shrinkage of Castings.

In locomotive cylinder, one-tenth of an inch in a foot; pipes, one-third of an inch in a foot; girders, beams, etc, one-third of an inch in fifteen inches; engine-beams, connecting rods, etc., one-third of an inch in sixteen inches; large cylinders, say seventy inches diameter, 10 feet stroke, the contraction of diameter, three-eighths of an inch at top; ditto, one-half inch at bottom; ditto, in length, one-third of an inch in sixteen inches; thin brass, one-third of an inch in eight inches; thick brass, one-third of an inch in ten inches; zinc, five-sixteenths of an inch in a foot; lead, the same; copper, three-sixteenths of an inch in a foot; bismuth, five-thirty-seconds of an inch in a foot; tin, one-quarter of an inch in a foot.

IT is announced that E. S. Lennox, representing the barbed wire manufacturing firm of Washington & Moen, of Worcester, Mass., was in Chicago on Saturday last, and said that he had purchased about 60 acres of land near the Calumet Iron & Steel Co.'s works, between 110th and 114th streets, for a site on which to put up a branch factory for the Washburn & Moen Manufacturing Co. Preliminary work had begun, and he was going east to arrange the details of the enterprise. The plant will cost $1,000,000, and 1,000 men may be employed.

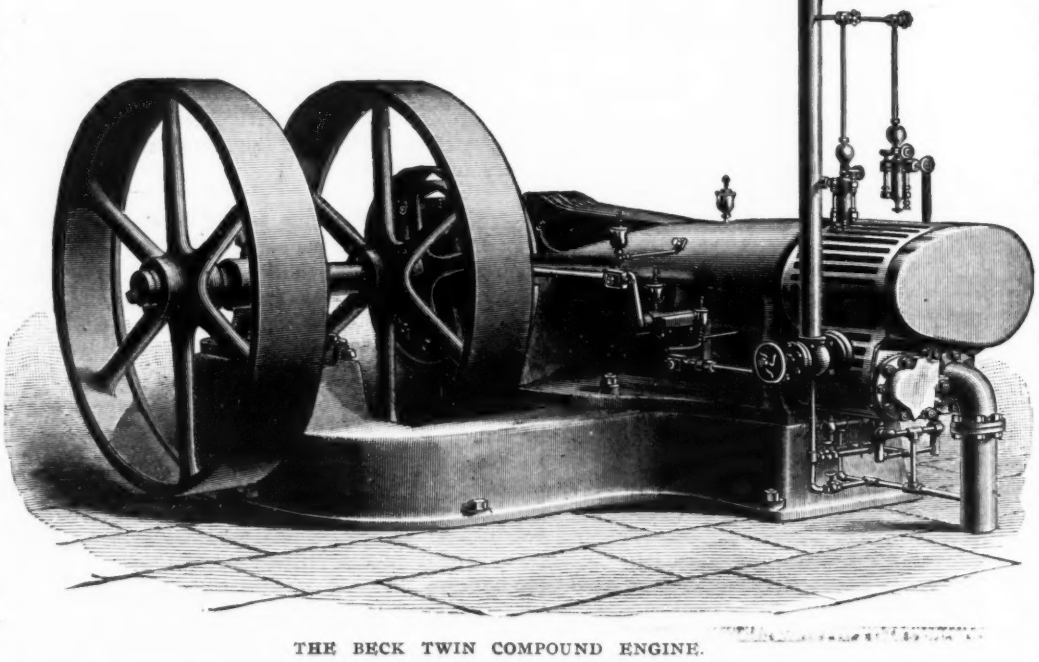
ONE lugubrious, but interested, European writer bewails the "attempt of the United States to commit suicide by imposing further tariffs on imported goods." Our census shows a population of 64,500,000 citizens, reasonably contented and certainly prosperous on the whole, and the "suicide" of protectionism appears to be largely responsible for their numbers, their existence and their generally encouraging condition. Possibly more of the "suicide" would help Europe perceptibly. The United States seems to thrive amazingly for a victim of the continued suicide habit.—[Iron Industry Gazette.

AT a test of the Redemann-Tilford (Kentucky) process of transforming low grades of steel into high grades, quite recently, old Bessemer steel rails were converted into steel from which, it is claimed, razors and surgical instruments may be manufactured.

IN 1836 only 109 patents were issued in the United States; in 1889, 23,600, the largest ever known.

THE BECK TWIN COMPOUND ENGINE.

The Beck Twin compound engine is a new and important departure in steam engineering, embodying features of special merit, as will be seen from the cut. Instead of placing the cylinders one in front of the other, as in the common style known as the "tandem," they are placed side by side with one common wall between them, hence the name "twin." Each cylinder has its own piston, and both are attached to one common cross head, which, in turn, is connected by one single connecting rod to the crank pin. Pressure on pistons is regulated so as to entirely equalize the strain. The valves are also placed side by side beneath the cylinders, with a chamber between them into which the exhaust steam from the high pressure cylinder is discharged through the port or opening between the valves. The cap or bonnet, as shown in the cut, serves as a connection between the end of the valve chamber of the high pressure cylinder and the port of the receiving chamber; each end is fitted with a bonnet, thus making a very short distance for the steam to pass from the ports of the high pressure cylinder to the chamber, whence it passes to the valve of the low pressure cylinder, and thence into the cylinder proper, where it exerts anew the expansive power still remaining after having done its work in the high pressure cylinder. This exertion of "expansive power anew" is explained by the fact that the short distance the steam has to pass through from one cylinder to the other prevents loss of pressure from radiation from heat, as does certainly occur through the ordinary methods of long and exposed receivers connecting the two cylinders. The wall or side of the exhaust receiving chamber next to the valve chamber of high pressure cylinder is exposed to the live steam from the boiler before it enters the high pressure cylinder, and thus helps to prevent loss of heat from the exhaust steam in the chamber. Still further protection is afforded the exhaust steam by passing it through the hollow piston valve of the high pressure cylinder, which is surrounded by live steam from the boiler preparatory to being distributed into the high pressure cylinder. The exhaust chamber is also of such proportion as to receive the steam without back pressure and prevents unnecessary expansion of the steam before entering the low pressure cylinder, the importance of which is readily understood by engineers. Besides the very important factor of economy, the simplicity of the arrangement commends itself to all interested in steam and engineering. Each cylinder and valve chamber is as easy of access as a plain single cylinder engine, a very decided advantage.



THE BECK TWIN COMPOUND ENGINE.

Tests made with a Twin compound non-condensing engine with high pressure cylinder of eight inch diameter, low pressure cylinder thirteen and one-half inch diameter, and with fifteen-inch stroke, the following results were obtained: During a continuous run of fifteen hours, an average horse-power of ninety per hour was developed on a consumption of one and eight-tenths pounds of coal and twenty-four pounds of water per-horse power per hour with a boiler pressure of one hundred pounds; during a continuous run of fifteen hours, forty horse-power per hour was developed on two and one-fourth pounds of coal and twenty-seven pounds of water per horse-power per hour, boiler pressure one hundred pounds; during a continuous run of eleven hours, twenty-five horse-power per hour was developed on three pounds of coal and thirty-five pounds of water, boiler pressure one hundred pounds.

The coal and water were ascertained by the actual weight and measurement of same as supplied to the boiler. The average evaporation in practice is nine pounds of water for one pound of coal, and the engine in the test should be charged with water in that ratio, as more or less water is carried with the steam from boiler; and with load of ninety horse-power per hour would mean eighteen pounds of water; and with forty horse-power load, twenty-seven pounds of water. The boiler employed in the tests is of the common return tubular type, with plain setting, using bituminous coal from the Cumberland regions, feed water at 208 degrees and all live steam pipe covered. For further particulars, address the manufacturers, the Taylor Manufacturing Co., Chambersburg, Pa.

A Model Manufacturing Town.

The new suburb of Cincinnati, which is to be the location of the Strong Locomotive Works, has been named Essenden, says the Chicago *Railway Review*, and plans are being perfected for its development into a model manufacturing town. The shops will be located at a point somewhat remote from the residence portion, which will be divided into two sections. One will be reserved for fine residences, and lots will be sold there only on condition that certain priced houses are to be built. The houses of the working men will be located in another section, and will be required to conform to certain rules governing the style of building, that are calculated to make even that end of the village superior in beauty to that of any other in the vicinity. The aim of the projectors is to excel in beauty the model village of Pullman, Ill. The location of the Strong Locomotive Works at that point is, of itself, expected to be the making of the village, but there are other manufacturing interests involved. The Hall Safe & Lock Works, of Cincinnati, are expected to remove their plant to Essenden, and other large concerns are contemplating the same step. There is also said to be some prospect of the establishment of car shops there.

SMITH'S RE-ACTION MACHINE HAMMER.

Smith Patents Engineering Co., of the Derby Works, Norfolk Street, Sheffield, has brought out a machine hammer for which they claim certain important advantages. We saw two at work on Wednesday, and were struck by the simplicity and efficiency of its operations. The hammer, which may be used as a stamp or press, can be fixed in any situation where there is a driving shaft or power machinery, is altogether independent of a steam boiler, as the power can be secured by gas, oil, or water motor. The inventor lays special stress upon the absence of complication in its construction. No stuffing-boxes or valves are required. Although constructed with a long cylinder, there is no piston requiring packing or rings. A tup rod, passing through a hole in the cylinder cover, is provided with a solid collar or swell, which does not need to fit close to the interior of the cylinder it being simply to afford a bearing for one end of a helical spring placed within the cylinder between the top cylinder cover and the collar on the tup rod. The rod is raised by a steel wheel, fitted with tappets or lifters, according to the number of blows to be delivered for each revolution of the wheel. As the wheel rotates, these tappets engage a steel crosshead fitted with steel antifriction rollers. Each time the tup rod is lifted by one of the tappets the spring is compressed between the collar on the rod and the top cylinder cover, the reaction of the spring, when the tappet leaves the crosshead, giving a blow of a force proportioned to the strength of the spring and the degree of its compression. A double set of steel spur wheels drives the tappet wheel. The double set is arranged on each side of the lifting wheel, with the view of equalizing the strain. The tappet wheel revolves on an axis which is mounted in adjustable bearings, arranged to slide in the frame of the hammer. India-rubber buffers or cushions are fixed between the bearings and the caps which retain them in position, to prevent undue vibration. The bearings or brackets can be moved backward or forward in the frame, so as to regulate the power of the blow. The driving shaft, which is also of steel, carries pinions for driving the tappet wheel, and also fast and loose driving pulleys and fly-wheels. A friction brake is fitted within the cylinder. This is connected by means of a lever and rod to a foot pedal, which enables the operator to have complete control of its hammer, to regulate the power of the blow by checking the descent of the tup. The inventor claims for this hammer that it is most economical in working, as there are no valves, glands, or steam, or any other fluid-tight joints. Consequently, packing is dispensed with, and the liability to get out of order is reduced to a minimum. The formation of the spring, it is claimed, minimises crystallization, and the power required to drive the hammer is stated to be exceptionally small. Several of these hammers are now on order, and its principle is well adapted for file-making and other Sheffield industries.—[London Engineer.

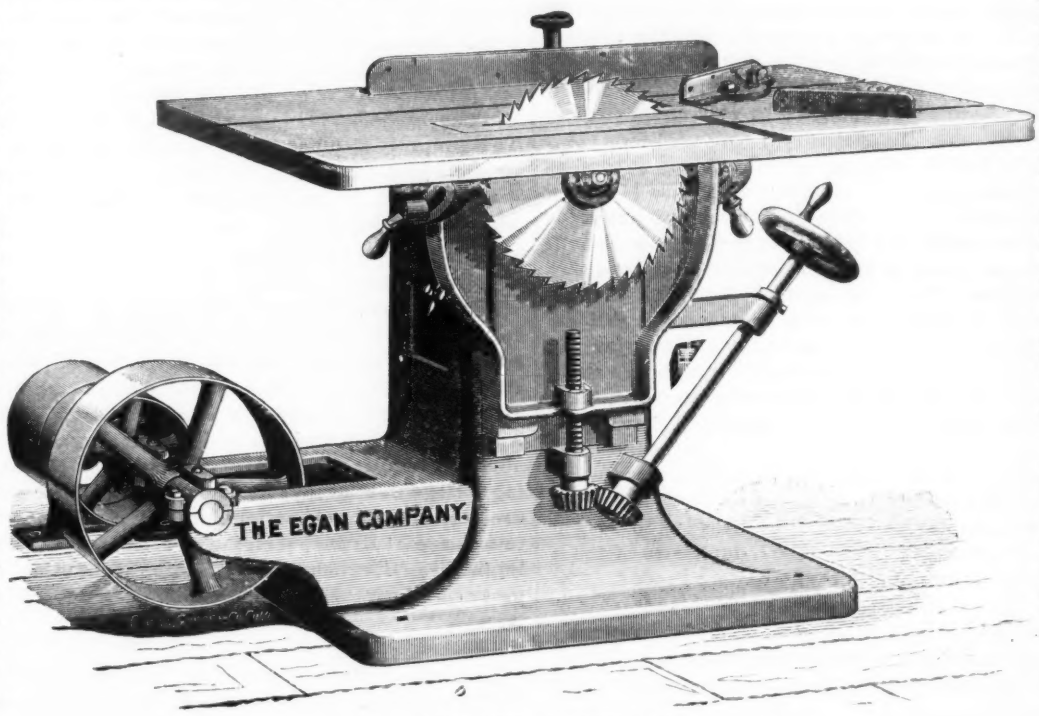
Big Iron Ore Cargoes.

In the record of big ore cargoes, the steel steamship Brazil, built by the Union Dry Dock Co., of Buffalo, and owned by M. M. Drake and others of that city, now ranks next to the Pontiac, built by the Cleveland Ship Building Co., and owned by the Cleveland Iron Mining Co. The Brazil has just delivered, at Ashtabula, 2,932 gross or 3,248 net tons of ore, just one ton less than the Pontiac's load of 2,933 gross tons, carried on a draft of 16 feet 2 inches. The new steamship C. B. Lockwood, 45 feet beam, owned by Mr. B. L. Pennington and others, of Cleveland, and built by Thos. Quayle's Sons, has delivered her maiden cargo, 2,442 gross tons from Ashland. She might have brought down a heavier load, as she was drawing but 14 feeet 10 inches, the work of loading her at Ashland being delayed until 10 o'clock at night. The new Bradley steamship, Hesper, built by the Ship Owners' Dry Dock Co., carried 1,878 gross tons on her maiden trip from Lake Superior, drawing even 15 feet. The Brazil; with 2,932 gross tons was drawing 16 feet, 7½ inches. Her dimensions are 265 feet keel, 40 feet beam and 25 feet hold.—[Marine Review.

THE declared value of cycles and cycling material exports to the United States from the Birmingham (England) consular district during the quarter ending March 31, 1890, amounted to $79,824.

NO. 2 IMPROVED VARIETY SAW.

These are progressive days to such an extent that time and labor-saving machines are sought for from every quarter of the civilized world. We display on this page a cut of something new which the well-known firm mentioned below has just brought out. The Egan tools are now known to be the very latest expressions of American ingenuity and they have a demand that is extraordinary and steadily increasing. This new No. 2 variety saw with bevel table is similar in design to the No. 1 machine, but made larger in proportion, to suit a greater range of work. The builders claim for this machine a nearer approach to the wants of the trade than any yet produced. The machine being all iron and steel, the great variety of work it will do and the precision and accuracy with which it can be handled, the convenience of adjustment, and the strength and durability of all its parts, stamp it as a standard machine for ripping, cross-cutting, beveling, cropping, grooving, mitering, etc.



NO. 2 IMPROVED VARIETY SAW.

The machine is self-contained, the frame being a cored pedestal supporting the table and carrying the countershaft. The table is made of cast iron, is well ribbed and braced, and can be set plumb at right angles with the saw or adjusted to any angle up to 45 degrees. The table is raised and lowered in planed, gibbed ways, with adjustment for wear. The mandrel is of the best cast steel and runs in self-oiling boxes. The fences can be used on either side of the saw, giving the operator every advantage and convenience, especially when using the table on a bevel. This is a point that will be appreciated by the practical sawyer. One 20″ saw is generally furnished with this machine and should run 2,100 revolutions per minute. This will be found a quickly adjusted saw for any purpose, and for pattern and wood shops of all kinds it will be found a great addition. For further information in regard to this, address the Egan Co., Nos. 251 to 271 West Front street, Cincinnati, O.

HOW SPIRAL WELD TUBING IS MADE.

The steel rolled for the manufacture of spirally welded tubes is slit into bands 12 inches and 18 inches wide. Tubes of 6 inches to 10 inches in diameter are made from bands 12 inches wide; tubes of 12 inches and larger are made from bands 18 inches wide. There is no arbitrary relation between size of pipe and width of stock, but it is more convenient to have two widths than a greater number. The sheets are at present rolled about 20 feet long, and a band of this length will make from 5 to 12 feet of pipe, according to diameter. To make ribbons of sufficient length to form a continuous pipe from 20 to 30 feet long, the strips of skelp must be welded end to end—three or four being needed, as the case may be, to make a pipe of full length. This "cross welding" of the skelp is performed by automatic machinery, and is a simple and economical process. The cross welds as now made are flush and practically invisible. They offer no obstruction to the passage of the material through the pipe machine.

The skelp, as cross welded, is rolled up and passed to the pipe machine. One end is laid on the guide table and pushed to the feed rolls, which draw it in. This rate of feed is adjustable by means of a mechanism which will be explained further on. The skelp must be shaped into the form of a tube by coiling it up. It passes over the face of a stationary water-cooled anvil horn, which, being smaller than the pipe, does not in any respect serve as a mandrel. The face of this anvil horn is slightly curved, and the side next the furnace, which is always exposed to intense heat, is protected by a face of refractory metal conforming to the curvature of the pipe. The formation of the pipe is affected by a device known as the "crimper," which is an oscillating curved jaw, acting against the face of the anvil horn and bending to the required radius the steel skelp interposed between them. The stroke is adjustable and is driven by a gearing, the motion coming from the main driving shaft through the intervention of a rachet and pawl.

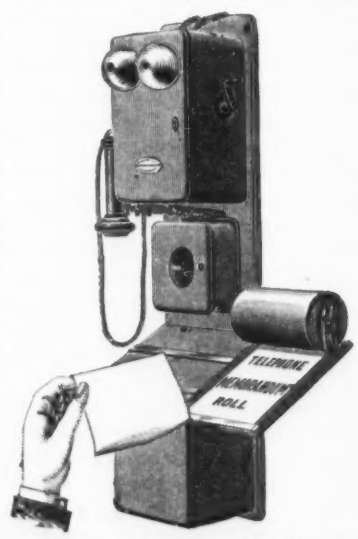
The metal so bent is guided in a cylindrical path across and around the anvil to the furnace and to the opposite side of the anvil, to bring it adjacent to the heated edge of the straight skelp. To avoid the friction of the sheet against the "former block," anti-friction rollers are provided at frequent intervals, set parallel to the spiral seam of the pipe. The inclination of the friction rollers tends to pull the pipe forward as fast as it is produced.

The two edges to be united by welding are the one straight edge of the skelp as it enters, and the outer edge of the coiled sheet as it comes upward around the anvil horn after passing the "crimper." At this point is located a small furnace, consisting simply of a mass of refractory material provided with a cavity, facing the refractory material of the anvil horn. Into this cavity enter one or more pipes supplying mingled air or gas under suitable pressure to form a blow pipe jet directed toward the edges of the sheet metal requiring welding. One heats the upper or entering straight skelp, the other the lower skelp, or that which has already taken the form of the pipe. A light hammer, striking 320 blows per minute, welds the two edges together as they meet on the anvil.

The skelp feeding mechanism is two-fold, being applied both to the skelp feeding rolls and to a set of rolls, which act upon the skelp after having passed the crimper. An important part of the machine is the mechanism with the aid of which the feed is varied at the will of the operator, the guiding principle being to move the skelp along faster as soon as the welding temperature shows indications of rising too high, and to retard the feed when the skelp is not sufficiently hot to insure a thorough weld. Through the arm and link the feed block may be shifted. The same slotted feed block is connected by an arm with the small eccentric on the shaft. The same feed block is coupled, by means of a link, with a rocker mounted on the same shaft with a pawl wheel shown, and small gear wheels not shown, meshing on the one side with the wheel partly hidden by the belt. Through a heavy connecting rod is driven the gearing which operates the feed rolls on the skelp feed tables, there being two, one behind the other. The same gear wheel on the shaft of the pawl wheel drives, through gearing, a connecting rod nearly horizontal. This operates the feeding rolls acting upon the skelp in the former mold. A train of three gear-wheels drive the second shaft from the floor, through which is operated a train of four wheels. They are all mounted on an arm, which, pivoting on the shaft, can be raised and lowered through the agency of a gear segment and the worm. The function of this part is to pull the pipe out of the machine axially whenever a seam or other irregularity tends to make it stick. The pipe is surrounded by a ring driven by the gearing, and provided with inclined rollers pressed elastically upon the exterior of the pipe. The ring is positively rotated at such a rate to the obliquity of the rollers that the pipe is drawn forward. The ring may be adjusted in size to the various sizes of pipe made, and at the same time performs the important function of propelling the pipe when it has been so far finished that the end feeds cease to operate. The emerging pipe is sustained on supports with trailing anti-friction wheels, which accommodate themselves to its double motion.—[Iron Age.

A TELEPHONE ATTACHMENT.

It is a very common thing to see the walls within the reach of the telephone operator disfigured with more or less legible memoranda; those who have used a pad fastened immediately on top of the battery box, have also experienced the awkwardness of the position for writing, as it is too directly in front of the operator. To meet this difficulty Messrs. Samuel C. Tatum & Co., of Cincinnati, O., are introducing a new telephone attachment, as herewith illustrated.



The very simple form in which they make it (that is, with no springs nor wires to get out of order, the tension being given by the weight of the paper roll itself), has the advantage of being attached to the telephone box without the use of any screws passing through the box. The telephone companies universally object to the use of any device which mars, in any way, the wood work of their boxes. In the Tatum attachment there are two wrought iron straps which hook over the top of the battery box, as shown in the cut, and beside this there is a slide under the board which is moved up and clamped against the other edge of the top of the battery box, so that the tablet is very firmly secured.

THE authorities at Freiburg, Switzerland, have given permission for an electric-power station to be opened in October, for distribution to small surrounding industries. From the waterfall there are 300 horse-power available, two thirds of which will be distributed for running electro-motors of a quarter to 25 horse-power, and the remainder will be used for electric lighting. The price for motive power to customers is 200f.—less than $49 per year.—[American Machinist.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MESSABIE RANGE.

A. H. Viele, auditor of the Iron Range road, in speaking of the Mallman Mining Co., which has been incorporated, said that the company had practically purchased the Mallman mine on the Messabi range. The company has never been incorporated before and the company is formed for the purpose of working the mine. Just how much work would be done this season, Mr. Viele could not tell, but the work of sinking test pits will commence in a short time. —[Duluth Herald.

MENOMINEE RANGE.

The big Chapin is still considerably behind the Norrie. The latter has sent out 350,621. The Norrie loaded 7,000 tons in one day recently. The Gogebic is crowding the Marquette range for first place. The great volume of ore sent out is source of wonder to those who contended that the country was in great danger of over production when we were shipping only about three millions of tons per annum. The world seems to be using it as fast as produced, and the chances are in favor of its doing so for very many years to come.—[Iron Ore.

At Chapin the 7th level of "C" shaft is being opened out, and as soon as practicable, connection will be made with "C 1" to the west. What is known as "C 1" shaft is a shaft sunk from the 6th level to the 8th, several hundreds of feet west of "C." It has been opened out to the east and west at the 7th level and about 200 tons per day is being hoisted to the 6th level by a skip operated by a large Rochester drum. The shaft is finished to the 8th level, and as soon as bearers are put in, this level will also be opened up and the skip will then be taxed to its utmost capacity and probably 400 tons per day will be hoisted. The intention is to get everything ready through this shaft, so that when the connecting drifts at the 7th and 8th levels are made, there will be nothing to do but to mine ore and send it up through "C" or "D."—[Iron Ore.

The Pewabic mine has shipped about 10,000 tons so far this season, and will close the season with a handsome output, considering that this is its first year as a shipping mine. A new boiler house is being built, 45x50, to be constructed of stone, in which will be placed two new boilers, duplicates of those now in use, and room will be had for two more when they are needed. The large amount of water to be handled at the Pewabic has made this increase of power a necessity. The new building will be completed in about two weeks. A spur track is being run in to near the new engine house, where a coal dock capable of holding 5,000 tons will be built.—[Menominee Range, Iron Mountain.

GOGEBIC RANGE.

A special dispatch from Ironwood, Mich., to the Milwaukee *Sentinel*, says: Shaft No. 3 of the Aurora mine was wrecked down to the 5th level by a cave-in July 14. For several days it had been noticed that the timbers were sinking and getting out of place, and all the men working at No. 2 and 3 shafts were ordered to quit work. The night shift of forty men were at work in No. 4 when the cave took place, and their escape without serious injury was remarkable. Fifteen men nearest to the caved portion were carried forty to sixty feet by the compressed air, heavy timbers in the drifts being forced down and lifted twenty feet from their positions. Three men loading ore from a stock pile were carried down thirty feet, and two escaped only by pulling their feet from their boots. A train of twenty empties passed over the caved portion less than five minutes before the ground settled. Shaft No. 3, from which more ore is hoisted than all the others, is completely wrecked down to the 5th level. The company had nearly completed a hoisting plant for this shaft at a cost of $25,000. The first three levels had been worked out, but the fourth had a great body of ore. The loss will be probably $200,000. The mine is controlled by the Penokee & Gogebic Development Co, commonly known as the Wisconsin Central syndicate.

An *Evening Wisconsin* reporter saw Jos. L. Colby the other day, and he is quoted as follows: "Joseph L. Colby has returned from the Gogebic range, where he went to learn the extent of the cave-in at the Aurora mine. The accident will not cause very serious interruption of work at the mine, Mr. Colby says, and the loss to the company will not exceed $5,000. The damage, he says, was all included in the disturbance of surface arrangements and the injury of No. 3 shaft. Such occurrences are expected, Mr. Colby says, in all soft ore mines, but in this case the cave-in was not anticipated quite so soon. All of the ore had been removed from the collapsed chambers. More or less delay has been caused in mining and shipping, as a result of the cave-in, and it is expected that in consequence the output of the Aurora for this season will be curtailed from 8 to 10 per cent."

Our townsmen, who are operating the Della option, near Upson, received word from Capt. Knowles, that he had something good for them to come and look at. A trip to the ground fully confirmed the statement. The earlier work had been near the quartzite foot-wall, and a vein of some six or eight feet in thickness of a good quality ore shown up at a depth of 125 feet. The present work was in search of the north vein. The shaft was located 250 feet north of the other and carried down 75 feet. A cross-cut was then run to the north, and it is in this, at a distance of about 40 feet from the bottom of the shaft that the new deposit was struck; and it has now been cut through—or rather across—showing a width of 20 feet. Only about half the drift is in the ore, showing how easily and certainly the deposit would have been missed had the cross-cut been started at a few feet less depth.—[Pick and Axe.

The Ironton mine, on which the lease was surrendered some time ago, has now come into the hands of a company with the necessary means to operate it on a scale to pay, and it has been appropriately re-christened the Phœnix. Shipments will begin again from the old shaft soon, and development work on the east end of the property will be carried on vigorously. The shaft which was sunk some two years ago to a depth of about 100 feet, will be carried down to 200 feet, when cross-cutting to the vein will begin—the shaft being in the quartzite foot-wall. The Phœnix can hardly be put in shape to make much of a showing on the shipping list this season, but there is no question that with proper development it will become a good paying mine.—[Pick and Axe.

There is a good-sized rumor afloat that the Tylers Forks mine has been sold for $600,000 to a Cleveland syndicate. Secretary and Manager W. R. Durfee is out of the city, so that the rumor could not be verified or denied. If this is true, it will make quite a boom for the mines on the Penokee range. A large amount of Ashland capital is invested in the mines and they are all making a splendid showing.—[Ashland Press.

J. H. D. Stevens, of Ironwood, has secured an option on the south half of the southeast fourth of section 9, and the south half of the south fourth of section 10, town 47, range 46. This latter lies just north of the Colby mine, the ore on which dips to the north on an angle of about 60 or 65 degrees. Mr. Stevens has formed a company and it is their intention to either sink a shaft or put down a diamond drill hole in the expectation of striking the Colby vein. They expect to have to sink about 2,000 feet before striking the foot-wall of the Colby vein. Mr. Stevens also holds an option on lot 4, section 21, town 47, range 47, being on the Canal Co.'s addition to the city of Ironwood This property also lies to the north of the regular iron range, and adjoins the Ashland Iron Mining Co.'s property on the north. He will shortly have a diamond drill at work with the same idea in view as at the property further east.—[Iron Spirit.

The North Shore:—

It looks as if the efforts to boom the recently-discovered Atikokan lake iron district, on the Port Arthur, Duluth & Western road, would be successful. Negotiations are now pending for the sale of several promising prospects in that neighborhood. Ten thousand dollars cash was refused a few days ago for an undeveloped eighty-acre location, lying north of the lake. The Port Arthur, Duluth & Western will run through the region and will reach there about November next. Mr Lougheed, P. L. S., has just returned after surveying a large tract of iron lands on Black Sturgeon river, covering several hundred acres, for American capitalists. Samples of the iron brought in show it to be a red hematite averaging about 65 per cent. metallic iron, and free from impurities. English capitalists are negotiating for the purchase of several properties near the Lone Pine, Champion and Silver Victoria group.—[Duluth Herald.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, July 16th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Humboldt	8,200	Prince of Wales	8,109
Barnum	5,483	Imperial	8,410	Prout	5,479
Buffalo	37,555	Jackson	50,329	Queen	39,753
Cambria	33,648	Lake Superior	131,679	Republic	89,028
Champion	101,291	Lillie	17,723	Republic Reduction Co.	1,115
Cleveland	108,084	Lucy	21,701	Salisbury	41,674
Cliffs Shaft	69,925	Marquette Ore Co	1 057	South Buffalo	42,157
Detroit	1,230	Michigamme	24,816	Volunteer	53,563
Dexter	630	Milwaukee	16,498	Winthrop	44,984
East New York	15,393	Negaunee	30 309		
Grand Rapids	3,443	Pitts. & L. Angeline	116,424		
Total, Marquette Range					1,124,699

MENOMINEE RANGE.

Aragon	7,885	Half and Half	383	Paint River	22,159
Armenia	12,654	Hamilton	10,029	Perkins	3,113
Chapin	302,621	Iron River	60,058	Pewabic	9,036
Commonwealth	49,161	Ludington	34,414	Shafer	25,525
Cyclops	25,317	Mastodon	32,816	Sheridan	595
Dunn	60,864	Millie	14,395	Vulcan	57,360
Florence	67,105	Monitor	4,547	Youngstown	15,095
Great Western	33,718	Norway	28,613		
Total, Menominee Range					877,263

GOGEBIC RANGE.

Albany	11,044	Eureka	6,602	Norrie	350,219
Anvil	17,750	Father Hennepin	4,561	Pabst	44 111
Ashland	190,819	Federal	3,302	Palms	13,365
Aurora	108,278	First National	105	Ruby	4.146
Bearer	1,405	Germania	20,826	Section 33	39,045
Brotherton	18,943	Iron Belt	47,166	Superior	10,251
Cary	21,342	Montreal	6,330	Trezona	26,544
Colby	100,726	Mt. Hope	22,757	Windsor	14,081
Total, Gogebic Range					1,090,665

VERMILION RANGE.

Minnesota Iron Co	218,183	Chandler	129,622
Total, Vermilion Range			347,805
Grand Totals			3,440.432
To corresponding date of 1889			2,858,837

Everything goes to show that shipping facilities are overtaxed. The rate of increase is not maintained. The shipments for the week fall nearly a hundred and twenty-five thousand tons below those of the week before. These facts confirm reports of docks, both shipping and receiving, being overwhelmed with ore, and also of a lack of vessels. The increase over last year's shipments for the same portion is now furnishsd almost entirely by the Gogebic and Menominee ranges.

A New Machine for Cutting Iron.

A machine for cutting up round or flat iron and steel, and much needed in mill work, has been invented. It cuts round iron or steel from one-quarter to one-half inch and flat up to quarter inch, as easy as one cuts a piece of card with pocket scissors. There is an opening for each size of round, while a drawing shear cuts the flat. There are several unique movements and points in connection with the machine which must be seen to be appreciated, especially the return of the blade after a cut has been made, and which is made without any springs to offer any resistance to the cutting motion. A great advantage and saving of time results from the finished manner in which the work is left after the cutting.

PROPOSED DUTY ON STEEL RAILS.

In a communication addressed to Hon. Justin S. Morrill, Chairman of the Senate Finance Committee, discussing the Senate amendments to the McKinley Tariff Bill, B. F. Jones, President, and James M. Swank, General Manager of the American Iron & Steel Association, argue as follows against the further reduction of the duty on steel rails:

Steel rails are manufactured in our own country and in other steel-making countries chiefly in heavy sections, or weights, for use in the tracks of railroads devoted to general passenger and freight traffic. All such rails weigh more than 25 pounds to the yard. But many rails weighing 25 pounds or less to the yard are made for use in mine railroads and in the construction of logging roads, roads on sugar plantations, etc. Requiring more labor and involving more waste to the ton than heavier rails, these light rails bring a higher price and their manufacture has been protected by a higher duty. Tariff legislation down to the present time has also placed a higher duty on iron or steel flat rails, punched, for use in street railroads, than upon heavy sections of ordinary rails, as more labor to the ton is required in their manufacture.

In the present tariff the duty on iron rails weighing above 25 pounds to the yard is $15 68 per ton; on steel rails weighing above 25 pounds to the yard, $17 per ton; on iron or steel rails weighing 25 pounds or less, $20.16 per ton; and on flat rails, punched, $17.92 per ton. In the framing of the Senate tariff bill of 1888, all these rails were placed in one classification, and were subjected to a uniform duty of $15.68 per ton, or seven-tenths of one cent per pound. It is taking a great risk to now classify light and flat rails at the same duty that is imposed on ordinary rails of heavy sections. In the House bill which the Finance Committee has just amended, the same classification has been observed and the duty has been fixed at $13.44 per ton, or six-tenths of one cent per pound. The Finance Committee proposes to still further reduce the duty to $11.20 per ton, or five-tenths of one cent per pound, which is just 20 cents above the rate fixed by the Mills bill in 1888 on rails weighing above 25 pounds to the yard.

We have no hesitation in saying that the steel rail industry of this country could not continue to exist in a healthy condition—paying good prices for its raw material and good wages to its labor—if the reduction proposed by the Finance Committee should be approved by the present Congress. Under certain conditions—high cost of raw material, high wages for labor and high rates of transportation—some of our steel rail works could not continue to make steel rails at all, as they would be ground between the upper and the nether millstones of foreign competition and the competition of the exceptionally well located works at home. In the end, by thus narrowing domestic competition, and especially by discouraging the erection at home of new steel rail works, steel rails would be dearer to domestic consumers than they have recently been and are now under the stimulating influence of fairly protective duties.

To prove that the reduction now proposed by the Finance Committee is entirely too great, we call your attention to the following statistics of our imports of steel rails in the three calendar years from 1886 to 1888, inclusive, *under a duty of* $17 *per ton, or* $5.80 *per ton more than is now proposed.*

Calendar Years.	Importation. Gross tons.	Duty.	Average price of American rails.
1886	41,581	$17.00	$34.50
1887	137,588	17.00	37 08
1888	63,016	17.00	29 83

The imports in 1889 were only nominal, because there was a boom in the European markets in that year and our own prices were low. In the three years given in the table, American prices were not unreasonably high, as the table shows, and yet in those years we imported 242,185 gross tons of steel rails, a sufficient quantity to lay 2,549 miles of railroad track with 60-pound rails. If so large an importation was possible in three years of reasonably low prices in our own country, what may we expect if a concession of the duty of $5.80 per ton is now made to the foreign manufacturer?

We respectfully suggest that, in the adjustment of a tariff on steel rails, the mere difference in the cost of production at home and abroad is not the only difference which should be considered. It is a misfortune of the steel rail industry of the United States which could not be avoided that the works which make rails are located at points more or less remote from the Atlantic, Pacific and Gulf coasts, so that, in the transportation of rails to all railroad lines located or terminating upon these coasts, foreign manufacturers have usually an advantage over our own manufacturers. If it is required, for instance, that rails shall be delivered at Boston, Portland, Charleston, Savannah, Mobile, New Orleans, Galveston or San Francisco, they can not be shipped to any of these points from any one of the steel rail works in the United States, if we except the steel rail works at Worcester, Mass., which have made only a few rails, as cheaply as from English works, ocean transportation being cheaper than rail transportation or even transportation by coasting vessels.

It is sometimes said that the cost of transportation across the Atlantic operates as an additional protection to our rail manufacturers, but the fact is that the very cheapness of this transportation operates to diminish the effect of a protective duty at all points on our extensive coast boundary. English vessel owners are glad to obtain cargoes of rails or other heavy iron and steel products at very low rates of freight as ballast for their ships which come to our shores for return cargoes of cotton and wheat. The freight cost of delivering English steel rails at any of the ports above mentioned on the Atlantic and Gulf coasts does not average above 10 shillings, or about $2.50 per ton, which, with the exception already noted, is less than the freight cost of shipping rails from any of our steel rail works to Boston or Portland, Charleston or Savannah, and is less than one-half the cost of delivering American rails t Mobile, New Orleans or Galveston. It costs from $8 to $10 per ton to ship rails from Pittsburgh to Texas. In delivering rails to ports on the Pacific coast, our manufacturers are at a still greater disadvantage with regard to freight charges. English rails can be delivered to ports on the Pacific coast at a freight cost of $5 per ton, whereas it costs $18 per ton to ship rails to the same ports from Chicago.

So much is the high cost of transportation in this country a hindrance to the complete control of the home market by domestic manufacturers, that English newspapers boast of the superior facilities possessed by English manufacturers in this respect. The London *Colliery Guardian* for the 14th of April, 1882, remarked upon this subject as follows:

"It is probably the fact that the quarter of the world known under the general designation of the United States of America is of such enormous extent that the prohibitory duties imposed by Congress upon foreign rails entering American ports *are rendered practically inoperative at certain points of Uncle Sam's wide dominions.* When the products of Pennsylvania rolling mills have to be moved into the extreme western territories of the United States, the cost of transportation becomes so heavy as to render the immense import duties imposed by Congress upon foreign rails comparatively, if not wholly, inoperative. A similar result is witnessed in the extreme South and Southwest of the United States. American iron-masters may indulge in high-flown reflections about the extent of their productive resources, but they cannot altogether overcome this formidable difficulty of heavy transport rates when they have to deliver their products to extremely distant points. *This is certainly a matter of encouragement to British iron-masters.*"

To this boast we add another which appeared in the columns of the same paper on the 8th of September, 1882. It then said:

"The growth of railroads in the Southwestern States is especially remarkable, and has assisted to swell the wonderful statistics which the Americans have been enabled to present for the last two or three years in illustration of the general railroad progress of the Republic. This is a point of some interest to the British iron trade, because Galveston, Tex., has been found to be still a market for British rails, in spite of the heavy duties imposed upon them by a Protectionist Congress. Protection would appear to be, after all, failing American iron-masters to some extent. Protectionist duties may have the effect of keeping foreign rails out of markets east of the Mississippi, *but they lose their intended influence in the vast territories west of that mighty stream.* Even now there are great gaps to fill up in connection with the railroads of the Northwest, the West and the Southwest of the United States, and it does not appear at all improbable that some quantity of British rails may be used in the establishment of the sections still required."

If these boasts could be made when the manufacture of steel rails in this country was protected by a duty of $28 a ton, how much more reason there would be for a repetition of them if the duty should now be reduced to $11.20 per ton.

Our steel rail works are all located inland because our supplies of fuel and of iron ore suitable for the manufacture of steel-making pig iron are so located. One of our steel rail companies has, however, commenced the erection of a steel rail plant on tide-water, near Baltimore, its furnaces to be supplied with foreign ores, but this enterprise is yet far from completion.

When we consider that our activity in railroad building is now largely in the South and Southwest, where no steel rail works exist, it becomes a question of the highest importance whether the facilities now enjoyed by foreign manufacturers in cheap water transportation are to be so increased by a sweeping reduction of the duty on steel rails that these manufacturers may virtually control the supply of the Southern and Southwestern markets. Our steel rail manufacturers should surely not be driven out of these markets because foreign manufacturers of steel rails can procure cheaper transportation, especially when one-half of our extensive establishments have been located in the Great West for the very purpose of supplying from Western raw materials the steel rail wants of the Mississippi Valley. Nor can there ever be any hope of building up a steel rail industry on the Pacific Coast, for the supply of its extensive railroad system, if the duty is to be put so low that no inducement shall be offered to capitalists there to engage in the manufacture of steel rails.

We are not advised that a single railroad company in the United States has petitioned Congress to reduce the duty on steel rails. We are confident that, if the opinions of the railroad managers of the country were requested on this subject, they would, with great unanimity, testify that they do not desire a reduction in the present duty of $17 per ton, and that they are particularly opposed to such a reduction as has been proposed by the Finance Committee.

With regard to the cost of producing steel rails in the United States, we can safely affirm that our manufacturers have done all that was possible to reduce this cost. It is not their fault that our steel-making ores are chiefly found in the Lake Superior region, nor is it their fault that Connellsville coke and natural gas are not found at Chicago and its vicinity, where four of our active steel rail works are located, or in Eastern Pennsylvania, New York and Massachusetts, where six more works are located. Their mechanical appliances are equal to the best European practice, but they have been and will continue to be handicapped by conditions with which their European competitors are not burdened. It was officially stated in 1888 that the books of of one of our principal steel rail manufacturing companies showed that the cost of transportation to its works of the iron ores, coke, limestone, clay and other materials used in making a ton of steel rails, in 1887, amounted to $12.75. This charge amounted to $1,591,332.92 on the total production of steel rails in that year, by the company referred to. Other steel rail companies can show similar figures for every year in which their works have been in operation. Our English competitors are not subjected to transportation charges which are at all comparable with those above given.

The charge has been made that the existing duty on steel rails, and the duty which preceded it, have increased the cost of railroad building, and thus

increased the cost of transporting agricultural and other products to market. That this charge is erroneous is shown in the low prices of steel rails in recent years, and by the following table of average freight charges per bushel for the transportation of wheat from Chicago to New York, from 1868 to 1889. This table will be found in the Statistical Abstract for 1889, compiled by the Bureau of Statistics of the Treasury Department:

Years.	By lake and canal.	By lake and rail.	By all-rail.	Years.	By lake and canal	By lake and rail.	By all rail.
	Cents.	Cents.	Cents.		Cents.	Cents.	Cents.
1868	22.79	29.0	42.6	1879	11.60	13.3	17.3
1869	25.12	25.0	35.1	1880	12 27	15 7	19.9
1870	17.10	22.0	33.3	1881	8.19	10.4	14 4
1871	20 24	25 0	31.0	1882	7.89	10 9	14.6
1872	24.47	28.0	33 5	1883	8 37	11.5	16.5
1873	19.19	26.9	33.2	1884	6.31	9.5	13.1
1874	14.10	16.9	28.7	1885	5 87	9 0	14.0
1875	11.43	14.6	24.1	1886	8.71	12 0	16 5
1876	9.58	11.8	16 5	1887	8.51	12.0	16.3
1877	11.24	15.8	20.3	1888	5 93	11.0	14 5
1878	9.15	11.4	17 7	1889	6.89	8.7	15.0

In the following table we give the average annual price in currency of American steel rails from 1867 to 1890—a table which of itself fully answers every criticism of our steel rail manufacturers that has ever been made:

Calendar years.	Average price in currency.	Calendar years.	Average price in currency.	Calendar years.	Average price in currency.	Calendar years.	Average price in currency.
1867	$166.00	1873	$130 50	1879	$48.25	1885	$ 8.50
1868	158.50	1874	94 25	1880	67.50	1886	34.50
1869	132.25	1875	68.75	1881	67.13	1887	37.08
1870	106 75	1876	59 25	1882	48.50	1888	29.83
1871	102 50	1877	45.50	1883	37 75	1889	29.25
1872	112.00	1878	42.25	1884	30 75	1890 (July)	31.00

The steel rail manufacturers have acquiesced in a serious reduction in the duty on rails from $17 to $13 44 per ton, as provided for in the House bill. This reduction was assented to after a long and careful examination of the whole subject, and in opposition to the views of some of our manufacturers, who contended that, as the present duty has greatly cheapened the cost of steel rails, and is not now objected to by any of the railroad companies, no reason exists for reducing it unless it was desired to encourage the importation of foreign rails. But the reduction was agreed to, nevertheless, and we now urge that this rate be accepted by the Finance Committee as the very lowest that can afford protection to our steel rail industry.

THE CHICAGO SHIPYARD AND LAKE SHIPBUILDING.

Chicago, or that part of it where 102d street intersects the Calumet River, about a mile from its mouth, lately celebrated the laying of the first keel for an iron or steel ship on the shores of Lake Michigan. This is rather quick work, as the Chicago Shipbuilding Co. was chartered in last November; but the men engaged in this enterprise are many of them from the Globe Iron Works, of Cleveland, the largest shipbuilding yard on the lakes. They propose to have their first two vessels, ore carriers of about 2,500 tons, ready for business at the commencement of next season. The yard is to be devoted exclusively to the construction of steel vessels. When it is in full operation it will give employment to about 1,000 men, increasing the population of Chicago by about 5,000, including women and children; an increment the Chicago people regret was not made before the census.

As an adjunct to the shipyard the Illinois Steel Co. is building a plate mill to roll plates for vessels and other uses, which will be the first steel plate mill west of Cleveland. Until that is completed the company will depend on the Cleveland rolling mill. It is hoped that a good deal of their product will find its way down the new drainage cut, when it is completed, to the Mississippi and to the sea.

The "Soo" canal is increasing its tonnage, 1,377,793 registered tons having passed through it during June; this was 24,115 more than in any previous month. And the tonnage on the Lakes must be increasing very fast, as the last supplement of the "Inland Lloyd's Register" shows a valuation of $55,126,309, as against a little over $50,020,000 at the commencement of the year. The size of the boats is also increasing. Thomas Quayle & Sons of Cleveland, are building one with 45 ft. beam, and the Detroit Dry Dock Co. propose building one with 50 ft. beam and 320 ft. on the keel, which will carry 4,000 tons in 14 ft. of water.

The West Superior Iron & Steel Co., which has let the contract for a Bessemer steel plant and machine shop to the Pittsburgh Iron & Steel Engineering Co., hope to have everything in readiness to manufacture ship plates, angles, steel rails, etc., within 12 months, expecting to supply the American Steel Barge Co. with material, and the last named company is moving its shipyard to West Superior.

The Lake shipbuilders, possibly through exceeding prosperity, are assuming airs of decided superiority to their less prosperous brethren on the Atlantic coast, claiming "there is little profit in competing with Eastern builders, as owners of coasting boats are satisfied with mediocre work." The Cramps, Roaches and Harlan & Hollingsworth, who think they put the best work and material into their vessels of any builders in the world, would hardly agree with the assertion. Many of the Lake freighters are undoubtedly very fine boats, however; the "Oswego," for instance, built at Buffalo, by Captain Drake, from plans by George B. Mallory, of this city, lately made the run from Buffalo to Chicago, 889 miles, in 54 hours and 15 minutes, or at the rate of 16 4 miles per hour. This is fast time for a boat devoted exclusively to freighting, and it is said that the "Saranac," another freight boat, can compete with her.—[Railroad Gazette.

The Chester (Pa.) Rolling Mill Co., at a recent meeting, voted to increase their capital stock from $600,000 to $1,000,000.

REPLACING WOOD WITH STEEL.

It is as well as settled that before long the Republic Iron Co., one of the wealthiest of the Lake Superior concerns, will follow the example of the other big shipping companies that are now operating lines of big steel steamboats in connection with their mines. The wooden barges of this company will be replaced by iron steamships, and the launch of the new Republic from the yard of the Globe Iron Works Co., Saturday, is the first move in that direction. The name of the wooden propeller Republic will be changed and she will be sold as soon as possible.

The new steel steamship Republic is an elegant boat, built after Mr. H. H. Brown's Castalia in almost every particular. She will carry three small spars without sail, alike to the Castalia, and this is one feature in her build that has called out a little interesting discussion. The Minnesota Steamship Co.'s big boats, just built by the Globe Co., have but one short stick forward, and Mr. H. P. Lillibridge, who is looking after the construction of the four Menominee boats now on the stocks, thought of even dispensing with the single spar and having but a tripod frame of some kind on the pilot house for the light. Capt. McKay is desirous of having the spars removed from the Mutual boats, Cambria, Corsica and Corona, and it would seem as though another season would find most of the large steel boats with clean decks. Some owners still find objection to abandoning the spars, however, and call attention to their usefulness at times. Capt. Landfair, of the Republic, calls attention to the use of the masts on the Castalia, when she was ashore a few days ago. The masts were utilized in hoisting ore from the hold, but on the other hand it is claimed that three small sticks might be carried on deck or in some out of the way place if it is necessary to have a derrick aboard ore carriers. The masts are evidently destined to go.

The Republic is the twenty-fourth steel steamship built by the Globe Co. since the reorganization in July, 1886, and No. 33 in the yard. Her dimensions are: Length of keel, 292 feet, 5½ inches; length all over, 308 feet, 5½ inches; molded depth, 24 feet, 6 inches; breadth of beam, 40 feet. She has water ballast tanks, with a capacity of 800 tons. Her engines are triple expansion, with cylinders 24, 28 and 61 inches, by a 42-inch stroke. She has two boilers of Scotch type, 14 feet in diameter and 12 feet 6 inches long, with a working pressure of 160 pounds to the square inch. Her wheel is sectional, 14 feet diameter, with a 16-foot lead. James Murray, formerly in the Specular, will have charge of her machinery. The new boat was drawing 4 feet 3 inches forward and 7 feet 5 inches aft with machinery aboard.—[Marine Review, July 17.

Six Months' Shipments of Steel Rails.

The steel rail market is very dull, with only small transactions being closed on the basis of $31@31 50, at mill, Pittsburgh quotations being $32@33, and Chicago $33.50@34. The majority of the mills are well supplied with orders up to October 1, although some of them could take business for September delivery. The only large orders now in the market for the Eastern mills is a lot of 7,500 tons for a Southern road, Savannah delivery, with an option of 2,000 tons more. Considering everything, the volume of business during the first half of the year was fairly satisfactory. The report of the Board of Control shows shipments for the first six months of 713,205 tons, to which one Western firm contributes 197,207 tons, and another Western mill 154,931 tons, and the Scranton Steel Co. shipped 101,143 tons, leading by 25 per cent. the next largest Eastern mill. It should be remembered, however, that these reports do not include light rails, nor do they count the Allegheny or the Colorado mills. It is safe to say that the rail product of the first half of 1890 will be found to be somewhere between 775,000 and 800,000 gross tons Out of the total allotment of 1,410,000 tons, the mills in the association report sales aggregating 1,190,516 tons. They have, therefore, on their books for the second half of 1890, 477,311 tons, or about three months' work. How completely the tone of the English market has changed since prices there were nearly equal to our own, is shown from the fact that English rails have been sold at the range of $26 50@27, delivered at Montreal. We understand that nearly 25,000 tons have been placed.—[Iron Age.

Armor Plates on Trial.

A special telegram to the Pittsburgh *Dispatch* from Annapolis, July 16, says: The board of ordnance experts, of which Rear Admiral Kimberly is President, met here to-day for the purpose of testing armor plates submitted by three English firms. American makers were invited to send samples of their steel plates, but the Bethlehem firm, the only company from which such large work could be expected, is not yet ready, and, consequently, the tests will be limited to the all-steel plate from Schneider & Co., a compound plate from the same makers, composed of an alloy of nickel and steel, and a compound steel and iron plate from Cammel & Co., of Sheffield, England. More than the usual importance is attached to these trials, which are intended to decide what kind of armor is best suited for ships, as well as for forts, and continental powers as well as the United States are interested in the results. The plates to be tested are 8 feet by 6 feet and 10½ inches in thickness, with 36 inches of oak backing. The 100-pounder projectiles from a 6-inch gun will first be tried, and then 250-pounder armor-piercing projectile from an 8-inch service gun. The plates are to be carefully examined and photographed after each discharge. The trials have attracted an unusually large number of strangers, and it is hoped to finish them before the close of the week.

Personal.

Mr. Robert Laidlaw, of the Laidlaw & Dunn Co., Cincinnati, O., sailed from New York, July 12, for Havre, France. Mr. Laidlaw will spend some time on the Continent, and will return by way of Scotland, where he will remain a few weeks.

TO BE HANDLED LIKE FREIGHT CARS.

With this issue, *The Iron Trade Review* presents a likeness in supplement form of the first steamboat built by the American Steel Barge Co., of West Superior, after Capt. Alex McDougall's model for whale-shaped freight carriers. It is with this class of steamboats—if all that has been said of the queer shaped crafts can be believed—that Capt. McDougall proposes to handle one hundred of the tow barges in the coal and iron trade. When one hundred, or even a smaller number, of the tow barges have been turned out of the West Superior ship yards, slips will be provided for them at both ends of the route. The steamboat coming down the lakes will bring a tow of the barges laden with ore, and returning immediately will use the same crews with another tow of the barges, light or loaded with coal, as occasion may require. The slips will facilitate the handling of the barges, so that the steamboats will spend very little time in port and the cost of labor on board the boats will be greatly reduced. They will be handled as locomotives handle railway cars.

This is only one of a number of stories that have been told of the plans for great work in the freight handling line with the McDougall barges, since construction on the first of them was begun three years ago. There is no denying that the builders are backed by a wonderful amount of capital in the American Steel Barge Co. for the construction of this kind of craft, and now that a steamboat follows five of the tow barges already in commission, and making money for their owners, additional interest is attached to the strange fleet in the lake marine and the bearing it may have on the cost of carrying bulk freight. Not a few of the owners of the lake floating property are of the opinion that the barges will carry ore and coal with profit at low rates, on account of the cheapness of the construction, but the shipbuilders who go on building costly steel and wooden ships for iron mining companies and individual capitalists, point to the care with which the few whale-shaped barges have been handled in mild weather, some of them declaring at the same time that they will build the new style of cheap boats for any one who may want them, when business in the old line gets slack, irrespective of any of the patents which Capt. McDougall claims. They say that there can be no patent on such a craft, and hint that the builders of them have taken their plans from the models of the general style of lake boats.

In the steamboat--Colgate Hoyt is her name—Capt. McDougall has, however, presented a craft that shows improvement over the tow barges. The *Marine Review*, to which we are indebted for the accompanying cut and description, sent a representative to Duluth, Mr. Sprague, to prepare the drawing of her which accompanies this paper, and it is the first in print. The The principal changes will be noticed in the house arrangements above deck. The hull is the same as the tow barges excepting in the run aft, which is more steamship like. It is claimed for her that she will carry about 2,600 net tons on 15 feet of water, and that with this draft her cabin deck will be 15 feet above water. She is 280 feet over all, 36 feet beam and 22 feet molded depth and has Hodge engines and aft compound engines with cylinders 26 and 50 inches by 42-inch stroke. The boilers, built by the Lake Erie Boiler Works, of Buffalo, are 11½ feet long, allowed 150 pounds to the square inch.

The quarters for officers and crew are far better than might be expected, and are in many respects equal to anything on the lakes. The cabin rests on three turrets, supported on the sides by 12 ventilation pipes. Four of these ventilate the engine room, four perform the same duty for the fire hold and four the cargo hold. The captain and officers will all have spacious quarters in the cabin above deck, which also contains a dining room. The different rooms are finished in oak and elegantly furnished. The wheelmen, firemen and other members of the crew have quarters below deck, forward and aft, and the engine room is large and well lighted. In the turret forward is one of the American Ship Windlass Co.'s steam windlasses with the capstan above. She has hand steering gear, with the shaft and hub of the stearing wheel of brass to avoid affecting the compass. On the port side of the cabin forward, just aft of the pilot house, there is also a chart room and office combined.

Capt. Ed Morton, of the Wilson fleet, will accompany Capt. C. H. Beach, who will be in command of the new boat, for one or two trips, and both masters declare shewill show a surprising speed. She will have a Hodge wheel of of coarse lead. The Colgate Hoyt may be expected down the river in a few days.

A Good Move in Patent Practice.

The Commissioner of Patents on the 13th of February rendered a decision bearing upon the inclusion in one application of claims for the method and claims for the apparatus by which the method may be carried out. He holds substantially that, while separate claims may be made for product and process, there can probably be but one patent, and hence but one application should be required by the office. So, also, where some of the claims cover a machine and others a supposed process, the latter being merely the function of the machine, one application is sufficient to secure the invention and is exhaustive of the applicant's rights. The same doctrine is applicable where claims are formulated upon the same structure, some to cover it broadly or in a general form, while others are specific in character.—[Iron Industry Gazette.

AUGUST *Wide Awake* bright as ever, has a beautiful story by Mary E. Wilkins, entitled "The Princess Rosetta and the Pop-Corn Man," with seven illustrations by Garrett. Another charmingly fanciful story in the same number is by Susan Coolidge and is called "Three Little Candles." As a contrast come "The Hat of the Postmaster," another Nassau story by Mrs. Fremont, "Cy Hoop's Victory," the story of a Canadian India boy at school, by H. C. Chipman, and Miss McLeod's Acadian tale, "The Story of Bloody Creek." Perhaps one of the best things in the number is a short paper by Louise Stockton, "A Game of the Senses," in which she suggests the development possible to the senses through the using of them. *Wide Awake* is $2.40 a year. D. Lothrop Co., publishers, Boston, Mass.

INDUSTRIAL SUMMARY.

New Enterprises :—

A. P. Thompson, Waryville, Tenn., is preparing to manufacture nails.

It is reported that Israel Holmes and Chas. L. Holmes will establish a steel casting plant, at Waterbury, Conn.

J. B. Hopkins & Co., of Birmingham, Ala., have become incorporated under the name of the Hopkins Stove & Roofing Co.

Samuel Croxton, an iron founder of Cleveland, O., it is stated, contemplates the erection of a foundry at Dayton, Tenn.

A party of capitalists, headed by Barry Coleman, of St. Louis, Mo., are to erect a rolling mill at South Pittsburgh, Tenn., that is to cost $150,000.

J. B. Hastings, of Toledo, O., is at Parkersburg, W. Va., endeavoring to create interest in the establishment, in the last-named place, of a wire nail works.

C. A. Strasser, E. T. Wille and Ernest Stoffregen have been incorporated at Baltimore, Md., under the name of Strasser & Co., for the purpose of engaging in the manufacture of tools.

The Beaver Tube Co., chartered with a capital of $1,000,000, at Wheeling, W. Va., will start work on the plant and build a town near Lewisburg. A big coal and coke enterprise will also be begun in connection with the works.

The Bessemer (Ala.) Machine & Foundry Co. has been incorporated. The capital stock is $100,000, with privilege to increase to $250,000. The incorporators are J. P. and G. W. Beggs, of Bessemer, and J. E. Lee, of Quitman, Ga.

The Batesville Iron Works Co. are a new corporation at Batesville, Ark. The President is J. C. Bone, G H. Kealer is Vice-President, and C. T. Rosenthal is Secretary. They propose to conduct a foundry business, and have a capital stock of $6 500.

It is stated at Tredegar, Ala., that negotiations that have been pending between the Jacksonville Mining & Manufacturing Co. and Northern and foreign capitalists haye successfully terminated, and a steel-working plant, to employ 3,000 men, is to be established.

At Rockmart, Ga., the Rockmart Land & Improvement Co. has been organized, with a capital stock of $1,000,000, to engage in mining and manufacturing. The incorporators of the company are C. M. Shelly, of Birmingham, Ala.; C. R. Harkins, of Atlanta, Ga.; W. P. Davis and others. They intend laying off the town of East Rockmart.

A number of Philadelphia and New York capitalists, who are interested in the development of the property of the Clinch Valley Coal & Iron Co., in Southwest Virginia, have organized a company known as the Richlands Tube Co , with the intention of erecting a large tube works at the town of Richlands, in the Clinch Valley. The Clinch Valley Coal & Iron Co. were organized in 1886, and have acquired about 46,000 acres of land in Southwest Virginia. Among the owners of the property are Evans R. Dick and Adolph Ladenburg, of New York, and W. A. Dick, Joseph I. Doran, Charles H. Mellon, George Willing, Samuel Heilner, Samuel P. Griffitts and George McCall, of Philadelphia. The company will manufacture wrought iron tube, and the works will have a capacity of about 125 tons a day. The town of Richlands, in which the works will be located, was founded during the present year, and already has a population of about 1,000.—[Bulletin, Iron & Steel Association.

The following new companies were granted licenses of incorporation by the Secretary of State of Illinois: Universal Electric Construction Co., Chicago; to manufacture and sell electrical machinery; capital, $500,000; incorporators, Charles M. Peale, Edwin Brainard and Frederick H. Wood.—Hardy High Speed Engine Co , Chicago; to manufacture and deal in steam engines and other machinery; capital, $100,000; incorporators, Mark P. Leonard, Malcolm N. Owen, and Lewis G. Blossom.—National Electric Ice Machine Co., Chicago; to manufacture ice and ice machines; capital $1,000,000; incorporators, Frank K Beggs, William M. McEwen, Grover E. Walker.—George L. Thompson Manufacturing Co , Chicago; to manufactnre machinery, hardware and novelties; capital, $25,000; incorporators, George L Thompson, David M. Mills, William Henry Gorman.—McGuire Machinery Co., Chicago; to manufacture machinery; capital, $22,000; incorporators, H. McGuire, O. P. Hurford, John Hoinsen.—Eureka Consolidated Mining Co., Chicago; to develop and operate mines; capital, $5,000,000; incorporators, Wingate English, James W. Moore, Albert H. Blair and William Holmberg.—American Security Co., Chicago; to construct railways and public works; capital, $2,000,000; incorporators, Randolph A. Pike, John Stirlen, Daniel M Silt and C. H. Durham.—Railway Equipment Co., Chicago; to manufacture railway supplies; capital, $250,000; incorporators, Irwin Veeder, Otto R. Barnet, P. R. Shumway.—Kansas City & Mexican Transportation Co., East St. Louis; to build railroad cars; copital, $500,000; incorporators, A J. Morris, Henry E Mills, Herman Ralf.—Ship Island Improvement Co., Chicago; to construct railroads, docks, locks, and to manufacture lumber; capital, $1,000,000; incorporators, Asa G. Pettibone, A. Henry Milliken, Edward F. Cragin.—Robinson Siphon Burner Co., Chicago; to manufacture smoke consumers and attachment for stationary engines; capital, $100,000; incorporators, Frank T. Robinson, Arthur W. Underwood, Matthew C. Myers.—Murphy & Potts Manufacturing Co , Chicago; to manufacture plumbers' materials; capital, $50,000; incorporators, George W. Murphy, Thomas W. Potts, Jesse D Frost.—Haven Air Purifying Co., Chicago; to manufacture air purifiers; capital, $50,000; incorporators, Albert C. Haven, Charles W. Harbach, Charles E. Woodruff.

Additions, Enlargements, Removals, Etc.:—

The Portage Iron Co , Limited, of Duncansville, Pa., contemplate building an open-hearth furnace.

The Steubenville (O) Iron & Steel Co. will remove to McKeesport, Pa. It will employ 700 or 800 men.

The business men of Elkhart, Ind., have arranged with S. D. Kimbark, of Chicago, to remove to their city the latter's factory, which is now located at

Quincy, Mich. The products of the factory are specialties handled by the heavy hardware trade. Work on the buildings at Elkhart is to begin at once and the removal will be made in September.

The iron foundry of Beard & Son, of Greenville, S. C., is to be moved to Spartanburg, S. C., according to a local report in the latter place.

The Clinton Furnace Manufacturing Co., of Wilmington, O., with a capital stock of $100,000, intend to remove their plant to Des Moines, Ia.

The Mosler Safe & Lock Co., of Cincinnati, O., will remove to Hamilton, O., ten acres of land and $85,000 in cash being given the company.

The Lookout Boiler Works, at Chattanooga, Tenn., is being enlarged and new machinery added. The proprietors now are Shea & Strable, who have recently succeeded Shea & Brothers.

The Oil Well Supply Co. is building a 36x84 feet addition to its foundry at the machine shop department, Oil City, Pa. An extra engine is to be put in the new department to run the blower.

The Gibson Agricultural Works, of Chattanooga, Tenn., has been incorported, with David Gibson, President, and A. L. Cayzer, Secretary. It will, it is stated, enlarge its plant and put in new machinery.

The Novelty Electric Supply Co., of Cincinnati, O., have removed from No. 83 Coleman street to No. 264 West 4th street. This change will give them increased facilities and make it more convenient for those desiring to call upon them.

Post & Co., Cincinnati, O., manufacturers and dealers in railway supplies, metals and machinery, have moved from 161-163-165 West Pearl street, to No. 181 West 4th street. In this more central location they will be better prepared to fill their orders and to see those needing anything in their line.

The plants of the Terminal Coal, Iron & Railroad Co., at South Pittsburgh, Tenn., are undergoing many improvements. Two new blowing engines have been ordered. The air cylinders are 96 inches in diameter and the steam cylinders 50 inches. It is stated that they will be the largest in the South.

The Irrigation Pump Co., of Greeley, Col., contemplate an increase of their present capital stock of $150,000, paid up, to $1,000,000, about August 15. The company will be reorganized and the capital augmented for the purpose of reaching out into new territory and developing several new patents, both in this and foreign countries. They control at present 12 separate patents on lift and force pumps. Their trade extends to every part of the United States, several of the South American countries and Mexico.

The works of the Columbia Iron & Steel Co. and of the Pennsylvania Construction Co., located at Uniontown, Pa., have been sold to English capitalists. The capital stock of the Iron & Steel Co. is $500,000, and the Construction Co., $50,000; $60,000 of the former and $10,000 of the latter is held by Uniontown parties. This means either increased prosperity for Uniontown or a decided decline. The two companies pay out from $20,000 to $30,000 to their employes every two weeks, hence the outcome of the deal will be looked for with interest.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, are enlarging their foundry department by the erection of a building 86x110 feet. It will contain a 15-ton open-hearth steel melting furnace of the Lash design and necessary annealing furnaces. It will also contain four hydraulic presses, two of 15 tons capacity each and two of 5 tons each. When the addition is completed, the firm will be able to turn out castings from the smallest size up to 15 tons. They will also make a specialty of casting steamboat shafts and semi-steel rolls. A number of other important improvements and additions are being made to the plant of this company.

Furnaces and Works Starting Up:—

It is stated that parties with plenty of capital have secured the Beaufort (S. C.) Foundry & Machine Works, and that it will be started up in a few days.

Fires and Accidents:—

The bolt mill of the Springfield (Ill.) Rolling Mill was burned July 13th.

The Colwell Iron Co.'s building, at Cartaret, N. J., was totally destroyed by fire July 11.

The Porter Foundry & Machine Co.'s foundry department, at Pittsburgh, Pa., including the addition recently erected, was destroyed by fire July 12. The company will rebuild at once an iron clad structure which will be as large and probably larger than the burned buildings.

The extensive machine works of J. C. Todd, one of the oldest manufacturing establishments in Patterson, N. J., was destroyed by fire July 20, entailing a loss of about $150,000. It was utterly impossible to check the progress of the flames until the numerous buildings were well nigh consumed. The fire is believed to have been of incendiary origin. The Todd Machine Works was the principal establishment in the United States for making hemp and rope machinery, and the owner was the pioneer in this country in producing improved machinery for this purpose. The products of the concern supplied many of the principal roperies in this country, Great Britain, India and Australia, and the works covered about two acres of ground. The pattern shop was not destroyed. If it had been the loss would have been doubled.

General Industrial Notes:—

Armstrong Bros., Springfield, O., want a 49 or 50 inch engine lathe, either new or second-hand.

The South Side Iron Co., which operates a charcoal furnace at Boiling Springs, Cumberland Co., Pa., has changed its name to the Boiling Springs Iron Co.

Honhorst, Littleford & Co., 137 to 141 East Pearl street, Cincinnati, O., are manufacturers of smoke stacks and other appliances for steamboats and manufacturing establishments, tanks, malt kilns and all kinds of perforated metal for millers, brewers, distillers and miners. This firm report doing a good business and orders come for the various articles made by them which are keeping them fully employed all the time. The business of this firm thus far shows quite an improvement over that of former years.

J. C. Welsh, mayor, Uniontown, Ala., is in the market for a stand-pipe 15x80 feet, and a steam pump, with a capacity of raising water from 130 feet below surface to stand-pipe at the rate of from 100 to 300 gallons per minutes.

Mhe Nubian Iron Enamel Co., 254 West Jackson street, Chicago, Ill., report a flattering condition of trade, orders far in excess of formers years, with collections fairly good. They expect to do fifty per cent. more business this Fall than last, which speaks well for their products, and the letters which they publish in fac similie are good evidence of the stability of the trade.

The Oliver & Roberts Mill Co., Limited, and the Pittsburgh Wire Nail Co., of Pittsburgh, Pa., announce that the business heretofore conducted by them will hereafter be consolidated into one organization, to be known as the Oliver & Roberts Wire Co., incorporated under the laws of Pennsylvania. The officers are Henry W. Oliver, President; Geo. T. Oliver, Vice-President; W. H. Cassidy, Treasurer; Stephen W. Tener, Secretary; Henry Roberts, General Superintendent.

William Tod & Co., of Youngstown, O., have recently shipped Hamilton blowing engines to the Vanderbilt Iron & Steel Co., of Birmingham, Ala.; to the Salem Furnace Co., of Salem, Va.; to the Clifton Iron Co., Ironton, Ala., and to the Riverside Iron Works, at Steubenville, O. They are just completing a pair of blooming mill engines for the Pennsylvania Rolled Steel Car Wheel Co., of Norristown, Pa, and have a large amount of engines and special machinery under construction for the Illinois Steel Co., Messrs. Carnegie, Phipps & Co. and the Pennsylvania Steel Co.

John Steptoe & Co., proprietors of the Western Machine Works, 214 West Second street, Cincinnati, O., manufacturers of machinists' tools, report doing a good business, and are receiving orders from every section of the country, which keeps them busy all the time filling same. This firm make a specialty of shapers, some of which were illustrated in a recent issue of this paper. The demand for these shapers is double that of last year. Mr. John Steptoe started in this business in 1845, making it one of the oldest firms in the city, and it has been carried on with success ever since.

The steam heating plant at the new United States Army post on the Highlands, near Newport, Ky., is almost completed. From tests made a complete circulation has been obtained upon one pound steam pressure in the boiler room. The main pipes, supplying fifteen buildings, travel 2,800 feet through brick trenches. The plant meets with the highest expectations of the contractors and engineers. The success attending the carrying on and completion of this very important work, reflects great credit, not only on the contractors having the work in charge, but as well on those who drew the plans from which the work was constructed.

The John Curtis Sons' Carriage Co., 11 and 13 East Sixth street, Cincinnati, O., make a specialty of fine vehicles and light buggy work of all kinds. They have had a good season's business in their fancy dog and small pony carts. Their business has much increased over that of past years, and the works have been pushed to the full capacity. As their trade is not confined entirely to the wholesale business, but dealing more directly with the customers, this increase is all the more encouraging. They claim to make a superior quality of goods, and they seek only first-class trade. As a result they have built up a fine business and their customers come from the very best class of people, those who want and will have nothing short of the finest quality. Some of their finest and most expensive carriages have an annunciator inside to call the driver's attention to whatever the occupants wish to tell him. While they have not made much effort in seeking foreign trade they are having some enquiries which may result in working up a large business.

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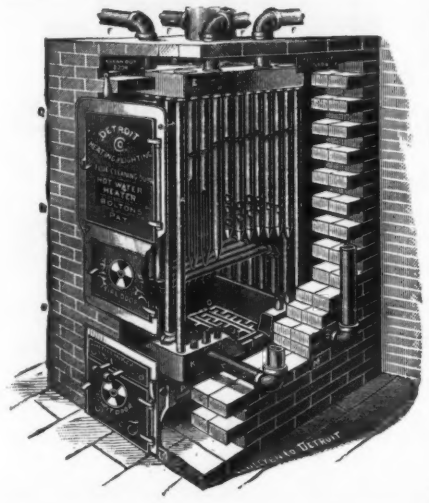

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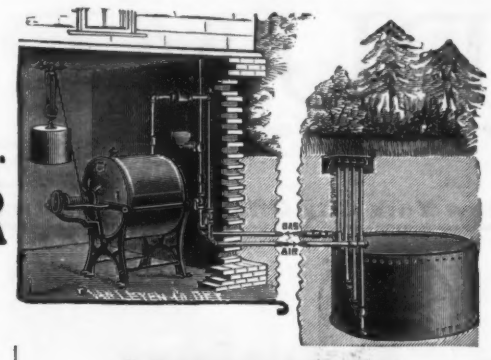

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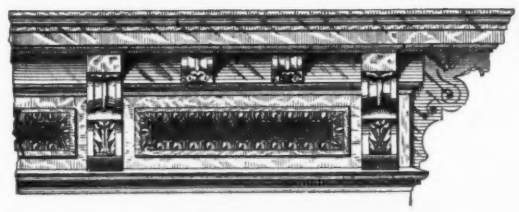

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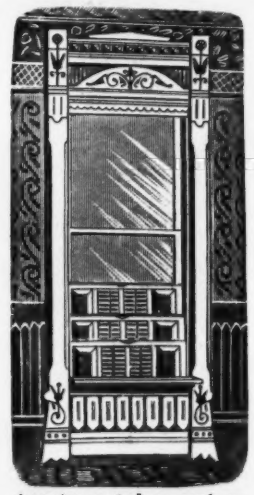

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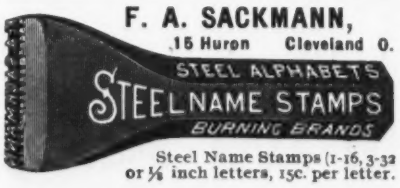

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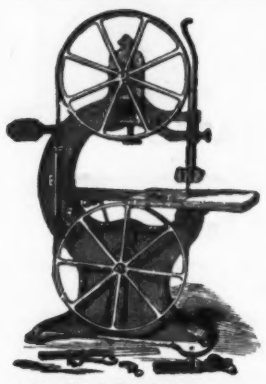

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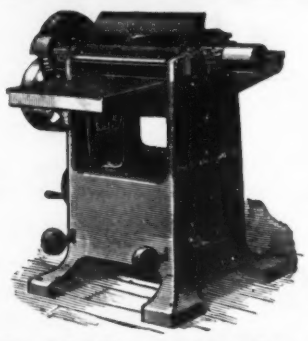

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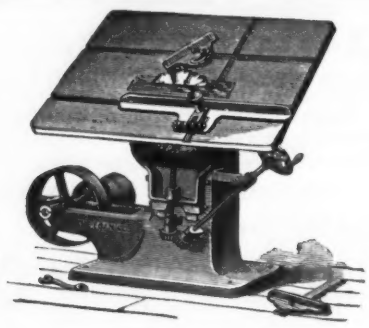

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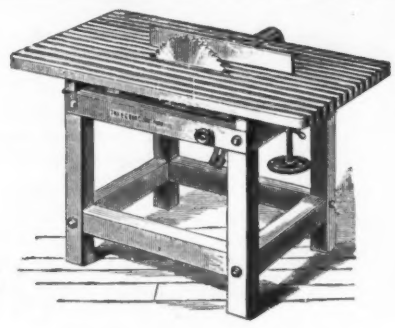

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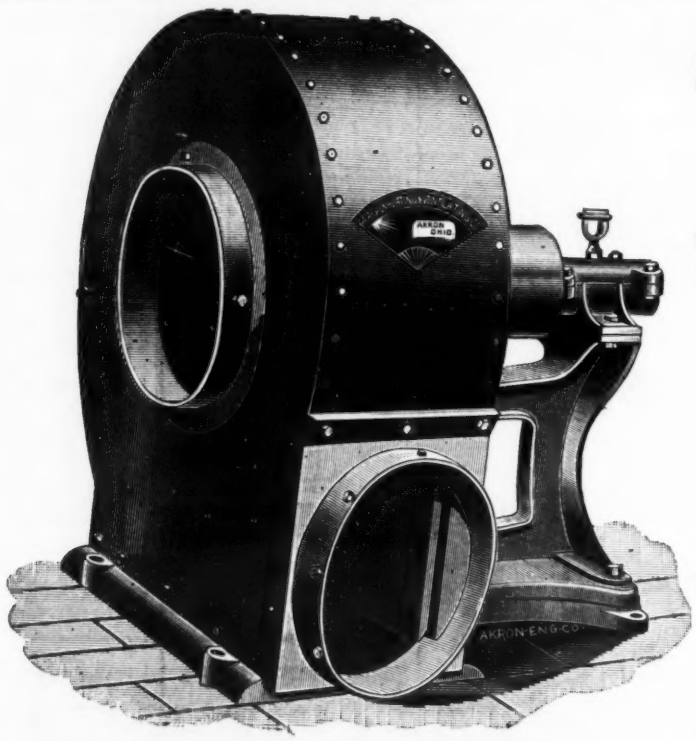

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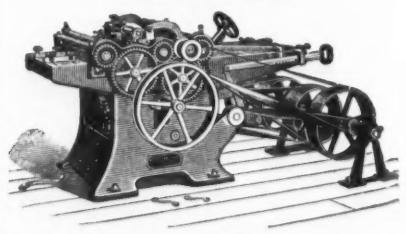

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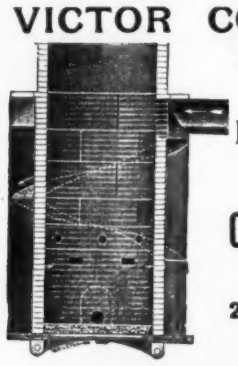

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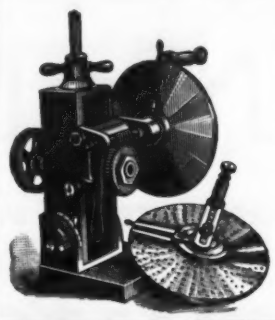

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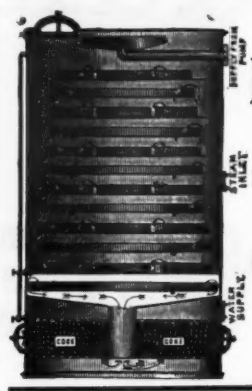

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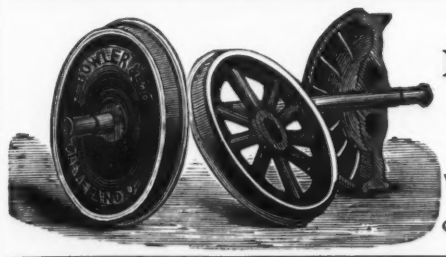

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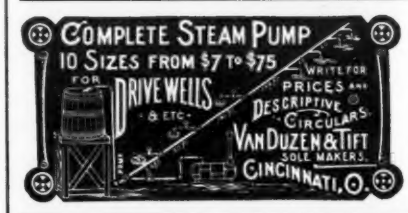
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LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri char coal, No. 2, $17 00@17 50. FORGE—Neutral coke $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@ 23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $16 25@16 50; Southern Coke No. 2, $15 25@15 50; Southern Coke No. 3, $14 75@15 00; Southern Grey Forge, $14 25@ 14 50; Southern Charcoal No. 1, $18 00@18 50; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $17 00@17 50; Missouri Charcoal No. 2, $16 25@16 75; Ohio Softeners, $18 00@ 19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $22 00@22 50; Southern, $19 00@ 22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $18 25@18 50; Mahoning and Shenango Valley strong, No. 2 Foundry, $17 25 @17 50; Niagara No. 1, $00 00@00 00; Niagara No. 2, $00 00@00 00; Niagara No. 3, $00 00@00 00; Ohio Softener No. 1, $18 25@18 50; Ohio Softener No. 2, $17 25@17 50; Lake Superior Charcoal, $20 00@00 00; Tennessee Charcoal, $19 50@00 00; Southern Softener No. 1, $16 75@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 75@00 00; Southern Strong No. 2 Foundry, $16 75@00 00; Alabama Car Wheel, $24 75@00 00; Hanging Rock Charcoal, $23 00@24 00.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 50@21 00; Lake Superior (coke) Bessemer, $20 00@21 00; Katahdin (Maine charcoal), $24 00 @25 00; Lake Superior Coke, Foundry, all ore, $19 25@20 75; Lake Superior Coke, Foundry Cinder Mixed, $18 00@19 00; Standard Ohio Black Band, $18 75@19 25; Southern No. 1, $17 00@17 50; Southern Gray Forge, $15 25@ 15 50; Jackson County (Ohio) Silvery, $19 00@ 19 50; Old Car Wheel, $20 00@00 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 50@17 75; No. 2 Foundry, $16 50@16 75; Grey Forge, $15 50@16 00; White and Mottled, $14 50@15 00; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal $23 00 @29 00; Bessemer, $19 25@19 75.

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 85
4½ to 6 by ⅜ to 1 inch	1 95
1½ to 6 by 1½ to 2 inch	2 25
1¼ & 1⅜ by ⅜ to ½ inch	1 95
1 & 1½ by ⅜ to ½ inch	2 05
⅞, ¾ and ⅞ by ⅜ to ½ inch	2 25

Round and Square.

1 to 1⅞ inch	1 85
2 to 3¼ inch	2 05
2¼ to 3¼ inch	2 35
3¾ to 4 inch	2 85
4¼ to 4½ inch	3 35
4¾ to 5 inch	3 55

Oval.

⅜ to 1¼ inch	2 25
½ to ¾ inch	2 45
⅞	2 65
1	3 05

Half Oval and Half Round.

1½ to 3 inch	2 95
⅜ to 1¼ inch	2 55
⅜ to ¾ inch	3 15
⅞	3 35
1	4 85

Heavy Band.

1½ to 6 by ¼ and 5-16 inch	2 05
1 to 1¾ by ¼ and 5-16 inch	2 15
¼ to ⅜ by ¼ and 5-16 inch	2 35
⅜ to ½ by ¼ and 5-16 inch	2 85

Hoops.

1¼ to 4, Nos. 13 to 15	2 65
1¼ to 2, Nos. 16 to 18	2 75
1¼ to 2, No. 19	2 85
1¼ to 2, No. 20	2 95
1¼ to 2, No. 21	3 05
1¼ to 2, No. 22	3 15
15-16, 1 and 1⅛, Nos. 13 to 15	2 85
15-16, 1 and 1⅛, Nos. 16 to 18	2 95
15-16, 1 and 1⅛, Nos. 19 and 20	3 05
15-16, 1 and 1⅛, No. 21	3 15
15-16, 1 and 1⅛, No. 22	3 25
⅞, Nos. 13 to 15	3 05
⅞, Nos. 16 to 18	3 15
⅞, Nos. 19 and 20	3 25
⅞, No. 21	3 35
⅞, No. 22	3 45
13-16, Nos. 13 to 15	3 25
13-16, Nos. 16 to 18	3 35
13-16, Nos. 19 and 20	3 45
13-16, No. 21	3 55
13-16, No. 22	3 65
¾, Nos. 13 to 15	3 35
¾, Nos. 16 to 18	3 55
¾, Nos. 19 and 20	3 65
¾, No. 21	3 75
¾, No. 22	3 85
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 75
11-16, Nos. 19 and 20	3 85
11-16, No. 21	3 95
11-16, No. 22	4 05
⅝, Nos. 13 to 15	3 85
⅝, Nos. 16 to 18	4 05
⅝, Nos. 19 and 20	4 15
⅝, No. 21	4 25
⅝, No. 22	4 35
⅝, No. 23	4 55

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 25
1¼ to 6 by Nos. 11 and 12	2 35
1 to 1¾ by ⅛ to 3-16 in	2 45
1 to 1¾ by Nos. 11 and 12	2 55
⅞ and 13-16 by ⅛ to 3-16 in	2 75
⅞ and 13-16 by Nos. 11 and 12	2 85
¾ and 11-16 by ⅛ to 3-16 in	3 05
¾ and 11-16 by Nos. 11 and 12	3 15
⅝ and 9-16 by ⅛ to 3-16 in	3 35
⅝ and 9-16 by Nos. 11 and 12	3 45
½ by ⅛ to 3-16 in	3 65
½ by Nos. 11 and 12	3 75

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 85
⅛ inch, " " " 13 and 14	3 05
¼ inch, " " " 11 and 12	3 15
¼ inch, " " " 13 and 14	3 35

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	¾c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅜ to 11-16 and 4¼	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅝ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
Spring	"	3 50
Sleigh Shoe	"	3 00
Toe Calk	"	3 25
Cutter Shoes, tapered and burr.	"	3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$19 50
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	13 50
Iron axles	22 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00
	GROSS TONS
Old iron T rails	24 00
Old steel rails	19 50
Old car wheels	18 50
Old copper	¾ ℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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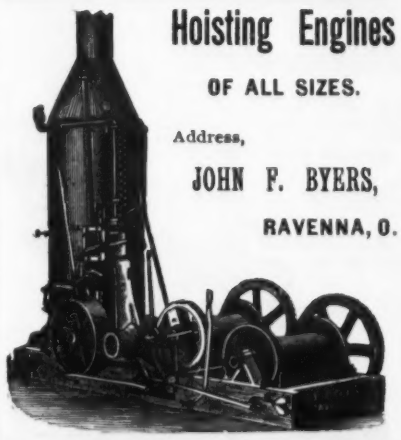
OF ALL SIZES.



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FORT WAYNE INDIANA

BUILDERS OF

WOOD WORKING MACHINERY.

WRITE FOR DESCRIPTIVE CIRCULARS

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¼

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.... dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70@70& 5
" " " extra.....dis 60&5@60&10
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard dis 60&10
Shultz Raw Hide Leather Belting, single.....dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill .....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills .....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50 & 5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10
Industry File Works, hand cut.....dis 50

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅛	8⅛	6	5⅜	5⅛	5
Washers	9	8	7	5	4⅜	4⅛	4⅜

In lots less than 100 lbs, ₩ lb add ¼c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 75@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¼
Sisal, ½ inch and over .....₩ lb 13¼

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Circular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls		21c@29c
No. 18 " " ¼ and ⅛ "		18c@28c
No. 36 " " ¼ and ⅛ "		16c@27c
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)		11⅛c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

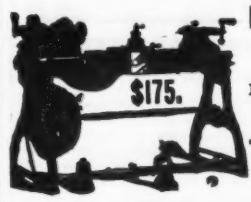
Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40



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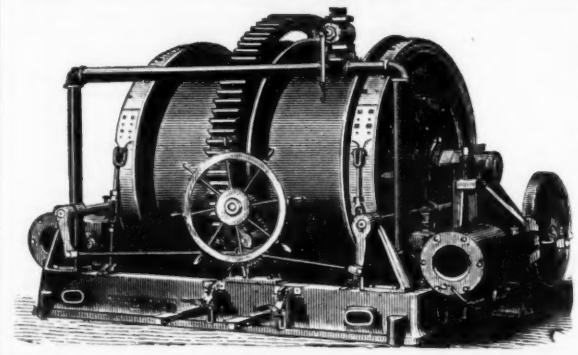

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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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LIGHT AND HEAVY
IRON CASTINGS.
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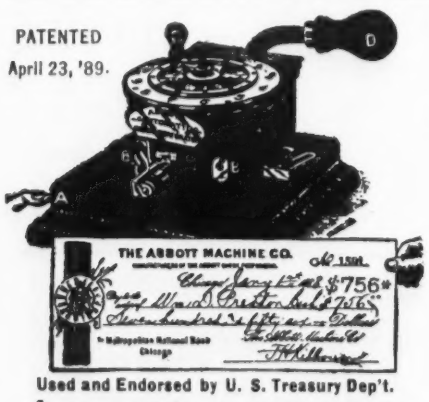

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Investigate and learn the risk you assume by not using it.

PRICE, - $30.00.

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CHAIN BELTING,

MADE IN ALL SIZES OF
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DESIGNED FOR
Elevators,
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For handling materials of all kinds.

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183 East 1st Ave.,
COLUMBUS, O.

PRICE $35.00.

It is the best wheel for boys, no doubt about it. There were several good ones; one of them best; the new one beats that. Our Little Giant is the new one, therefore the best. But the No. 4 with ball bearings all around beats that.

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Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10

Sargent's list

Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 7c&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 7c&5

Chains.

Revised List.

Trace, 6¼-10-2.....₩ pair 1.03
Trace, 6¼-10-3.....₩ pair .92 .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5¼@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11¼ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ₩ lb.	23	24	25	26	28	dis 25&10
Putnam, ₩ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10

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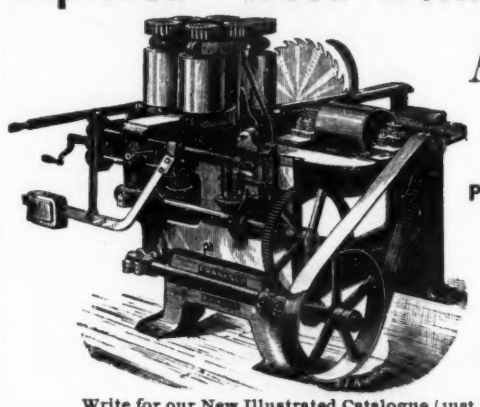

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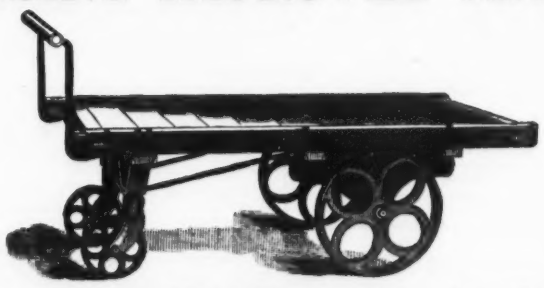

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100	"	Cutoff, side crank	700
70	"	Plain, side crank	500
3 50	H.-P.	Plain, side crank, each	350
1 40	"	Plain, side crank	300
2 35	"	Plain, side crank	275
1 25	"	Plain, center crank	260
1 20	"	Plain, center crank	240
1 20	"	Plain, side crank	180
1 16	"	Plain, center crank	180
1 14	"	Plain, side crank	100
1 12	"	Plain, center crank	125
1 12	"	Plain, side crank	100
1 10	"	Plain, side crank	100
1 8	"	Vertical	75

Boilers Complete.

75	H.-P.	Tubular	$500
70	"	Portable	500
60	"	Tubular	400
50	"	5 flue	325
35	"	Portable	300
30	"	Portable	325
2 25	H.-P.	Portable, each	300
18	H.-P.	Portable	2 0
2 15	H.-P.	Portable, each	200
30	H.-P.	2-flue	190
25	"	2 flue	190
35	"	Vertical Tubular	250
15	"	Vertical Tubular	160
10	"	Single flue	100
8	"	Single flue	95
10	"	Tubular	140
8	"	Tubular	110
10	"	Portable	125
5	"	Vertical	65

Boilers and Engines Complete.

30	H.-P.	Portable detached	$600
25	"	Portable, on wheels	500
25	"	Portable, on skids	475
25	"	Portable, detached	500
20	"	Portable, detached	450
16	"	Portable, on skids	400
16	"	Portable, detached	375
14	"	Portable, on wheels	300
12	"	Portable, on wheels	275
10	"	Portable, on wheels	250
8	"	Portable, on skids	160
10	"	Vertical Boiler and Engine	225
6	"	Vertical Boiler and Engine	160
4	"	Vertical Boiler and Engine	115

8" 3-side moulder ... 100
26" circular resaw ... 100
6-saw gang lath mill ... 75
38" Hall's patent shingle machine ... 150
Lime extracting pan heater 60 H.-P. ... 75
Bolt Cutter ... 40
Corn & Cobb feed mill ... 25
30" Bradford French burr mill ... 100
26" double surfacer and matcher ... 400

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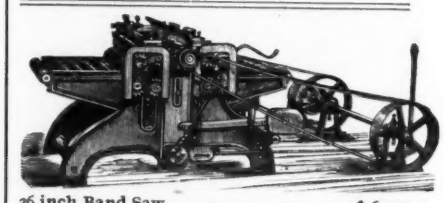

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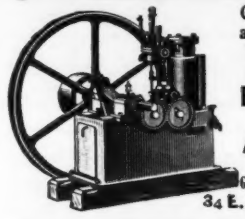

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Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

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Wheeling and Bellaire.	7 45 a m	12 50 p m
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	*11 10 p m	.....
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Ravenna Accom.	5 00 p m	8 25 a m

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	d 8 00 p m	5 40 p m
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No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
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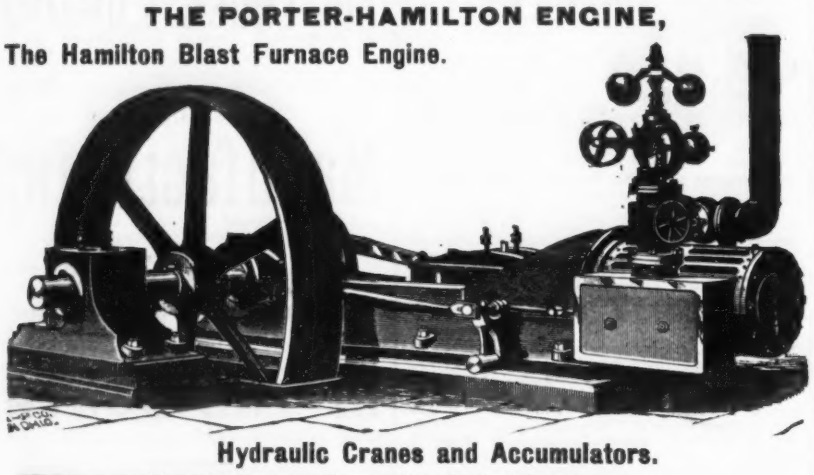

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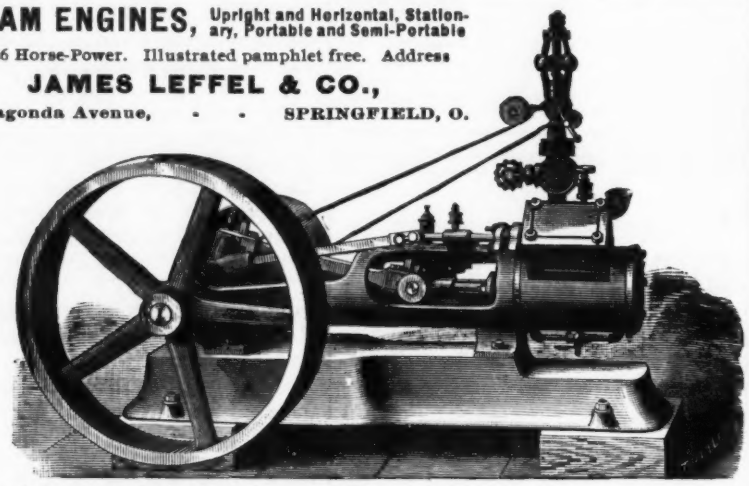

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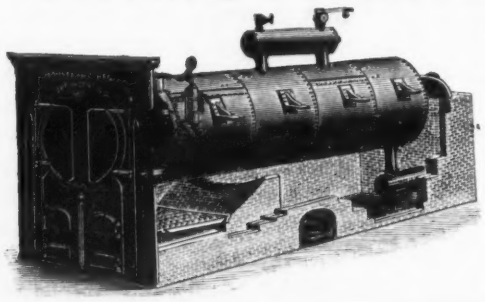

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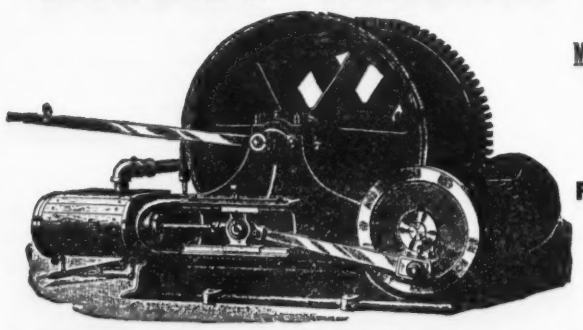

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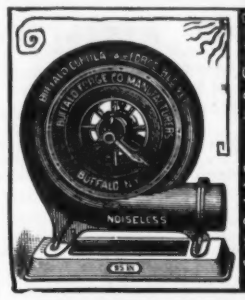

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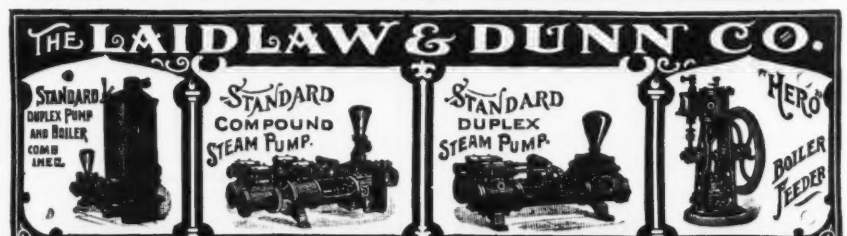

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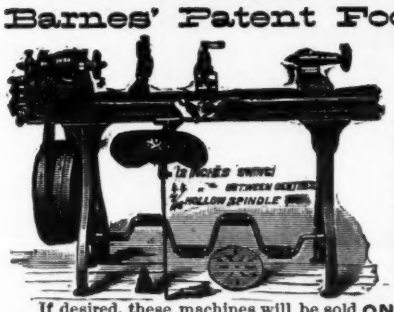

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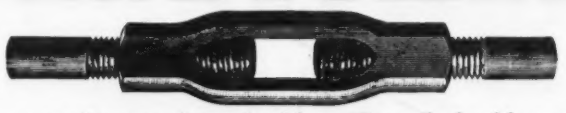

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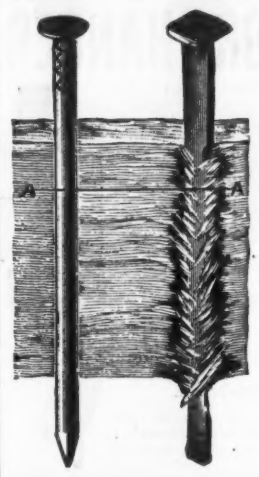

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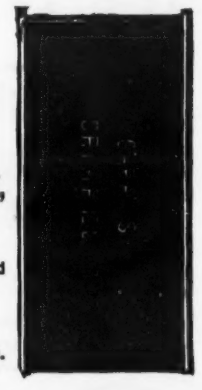

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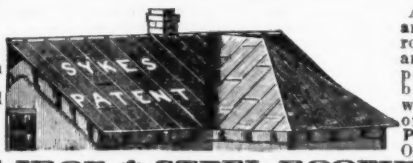

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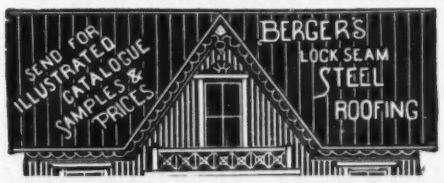

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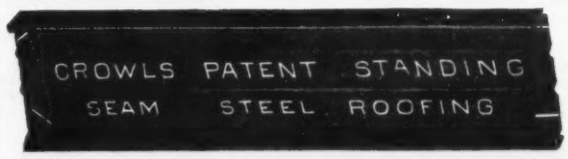

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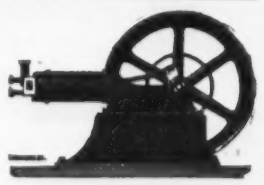

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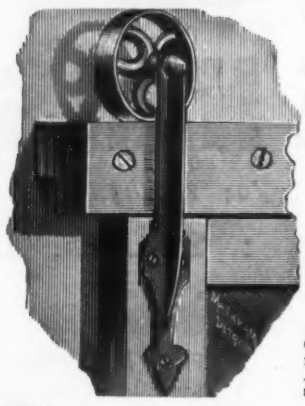

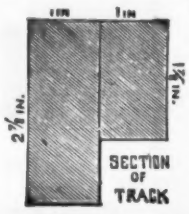

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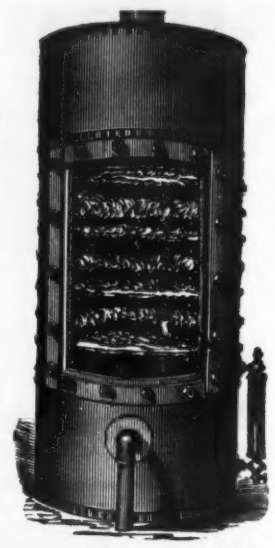

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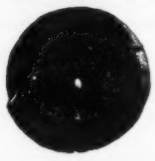

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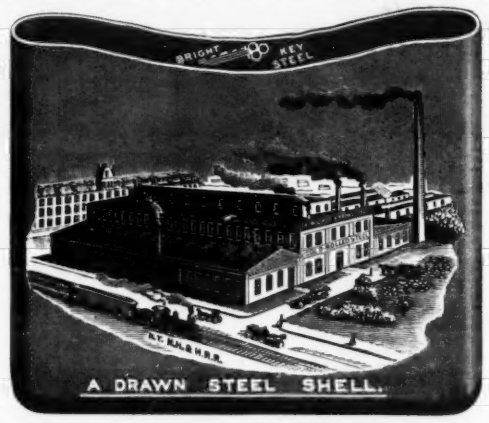

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